Chemical Age

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VOL. 78 No. 1989

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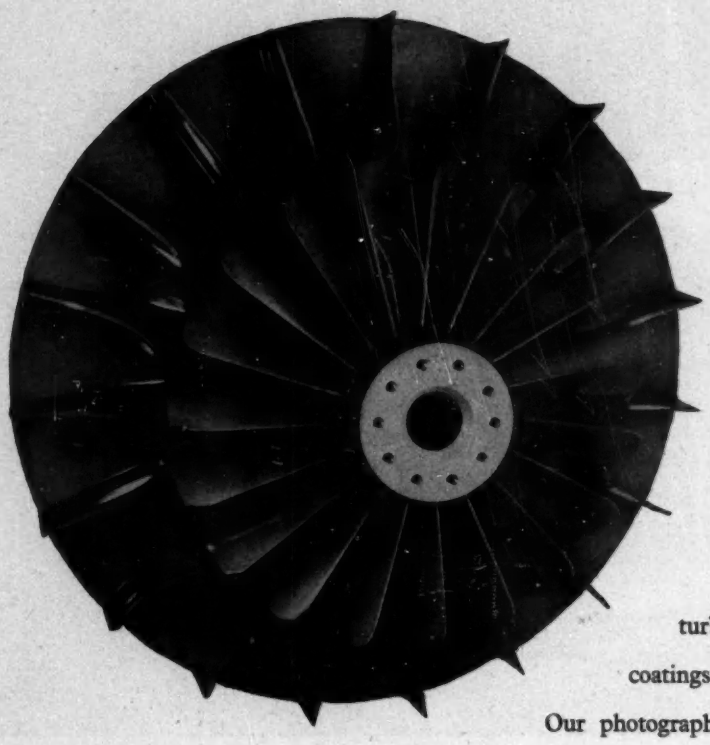

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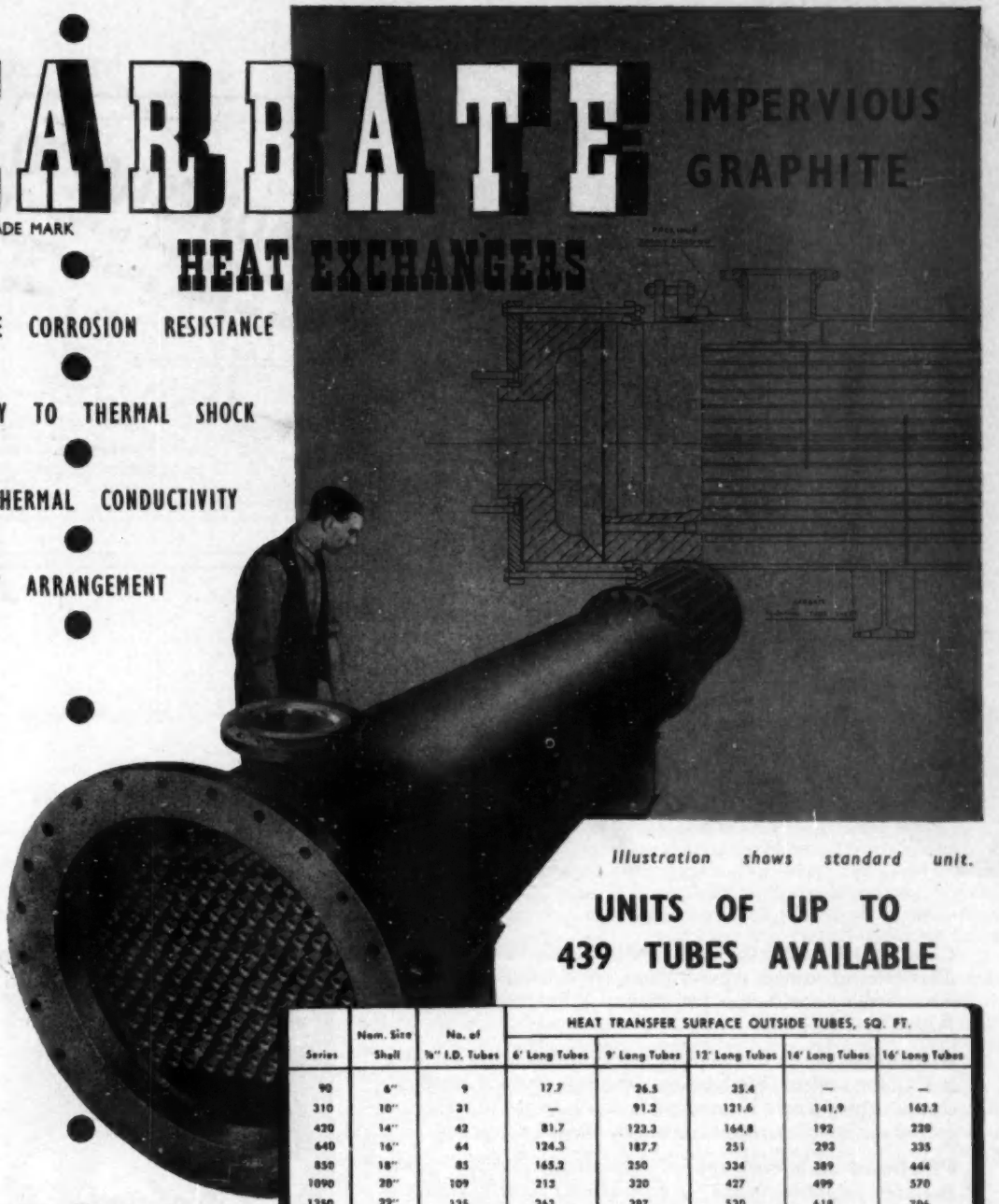

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850	18"	85	165.2	250	334	389	444
1090	20"	109	213	320	427	499	570
1350	22"	135	263	397	530	618	706
1630	24"	163	317	479	640	746	852
1950	26"	195	379	573	766	892	1017
2330	28"	233	453	684	914	1166	1217
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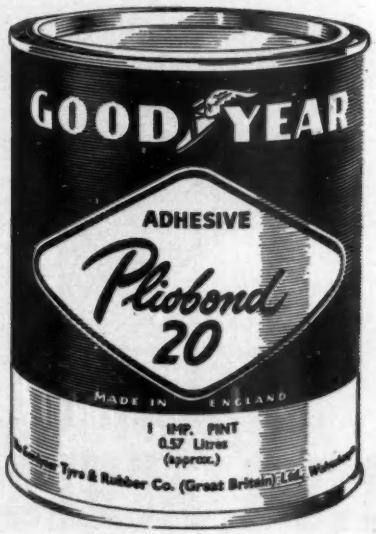

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Editor M. C. HYDE
Manager H. A. WILLMOTT
Director N. B. LIVINGSTONE WALLACE

Midlands Office
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

Leeds Office
Martins Bank Chambers, Park Row, Leeds 1. [*Leeds* 22601]

Scottish Office
116 Hope Street, Glasgow, C2. [*Central* 3954-5]

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CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

SOUTH AFRICA'S DEVELOPMENT

SINCE the war years South Africa's chemical industry has grown rapidly. Although industrial development in the Union has been essentially a matter of private enterprise, the South African Government owns a number of important industrial concerns. Included are the extraction of oil from coal, the mining of phosphates and the production of insecticides for mass use.

At the close of the war years, the Government owned a large chemical factory which it wished to retain as a 'shadow' factory for defence purposes. In order to make economic use of it in peace time it was converted into a factory for the manufacture of insecticides. This decision coincided with the Government's campaign to eradicate the malaria-carrying mosquito and tsetse fly, which, of course, required considerable quantities of insecticides. Today, the company produces enough insecticides to export them.

Oil from coal has been another scheme which has been developed. Started as a private enterprise in the early 30's, the project became an attractive proposition, having regard to South Africa's low cost coal, for the South African Government. Accordingly, the corporation known as Sasol was founded. The works are now in production, but have not been without noticeable 'teething 'troubles. Capital costs were heavier than had been anticipated and equipment, supplied from abroad, proved to be faulty. Loss of production has therefore produced heavy costs.

It is believed that Sasol will be able to produce economically at world prices but only time will show whether the heavy capital outlay can be recovered. If, indeed, Sasol is successful economically, the availability of cheap coal in South Africa would make the establishment of many more such plants well worth while.

The value of Sasol may be realised in a different way. At Sasol there is a very large source of hydrogen to which access can be had for the extraction of deuterium. If research on this project is successful, South Africa would be in the unique position of having available more than enough nuclear fuel and also one of the best moderators known in reactor technology.

Also run by the state is the Phosphate Corporation, Foskor. Until the discovery of additional deposits, successful mining was not possible. However, as phosphates are important for South Africa since such a large part of the country is deficient in phosphates, it was considered worth while to develop what deposits there were as a standby. This task was undertaken by the Government, hence Foskor.

Foskor has indicated that the phosphate deposits are more extensive than originally thought. Also, in the same area, there is a large quantity of low-grade copper ore. The possibilities associated with the ore are now being examined by two private corporations and it remains to be seen whether private enterprise will take over phosphate development.

South Africa's resources in this atomic age can be described as fabulous. At present the Union is the second largest producer of uranium, and its known reserves of 370,000 tons of uranium oxide are only 17,000 tons less than those of the US and Canada combined. South Africa is also the sixth largest producer in the world of beryllium, which has great possibilities in atomic processes. Beryllia ore sells at £140 a ton but the price of the pure metal lies between

£22,000 and £160,000 a ton, depending on the degree of purity. Other valuable metals present in the Union are cadmium, lithium, tantallum and vanadium.

From the present £66 million programme of uranium extraction plant construction, indirect benefits will accrue. It is of interest to note that South African technicians have been sent to Canada to assist in establishing uranium extraction plants there. As uranium plant instruments are another very important feature of the extraction operations, there has grown up a large body of skilled South African instrument mechanics particularly in the electronics branch. At present a research and development programme is being drafted to enable South Africa to take full advantage of developments in the atomic energy field. Some leading authorities in the Union believe that nuclear power could be competitive with the present costs of electricity in all areas of the Union except the Witwatersrand. Development of nuclear power would then leave the large coal reserves of the Union as a raw material for the chemical industry.

What else lies ahead for South Africa? The Union must not neglect research and development work on improving the extraction and the processing of uranium and thorium, nor must exploitation and processing of other minerals and metals required in conjunction with the use of uranium be forgotten. As Sir Roy Welensky said recently when he opened the Federation of the Scientific Council for South Africa of the Sahara, near Salisbury, the scientist has made a tremendous contribution towards the developments already taking place in the various territories of Africa, but what had already been done was small in comparison with what could be achieved in the future.

CHEMICALS IN RHODESIA

OFFICIALS in Rhodesia believe that the Rhodesian chemical industry has now reached the stage where it can set the pattern for future industrial development in that part of the world. The need for uranium and other metals and minerals has provided a significant boost to South African and Rhodesian economy as a whole. The next major step undoubtedly concerns the chemical industry even more directly. This is the manufacture of sulphuric acid. This particular point was made by Mr. C. J. Hatty, the Southern Rhodesian Minister of Mines, when he addressed the Transvaal Chemical Manufacturers' Association recently.

Usage of sulphuric acid has long been regarded as a barometer of industrial activity and development. Imports of sulphuric acid into the Federation in 1955 were nearly seven times those of 1954. The first separate sulphuric acid plant in Southern Rhodesia is now under construction and it is understood it will be large enough to satisfy internal demand. Such a plant will reduce the present high costs of sulphuric acid due to the rail freight charges which now form a large part of the price of the acid. Raw materials in the form of iron pyrites are available in ample quantities.

Production of this acid would open up clearly defined lines of progress, Mr. Hatty has stated. Thus, it would enable fertilisers in the form of superphosphate to be produced and with this in view a superphosphate plant is already under construction. Phosphates from Rhodesia's own deposits can be used. Manufacture of nitrogenous fertilisers is expected to arise out of expansion of steel production or from direct utilisation of coal gas.

Internal production of fertilisers in Rhodesia will, of course, cut down imports and would, therefore, materially assist the country's balance of trade and balance of payments. There is not only this aspect of fertiliser production but there is now under way an ambitious scheme which aims at transforming the native areas into efficient farms with planned crop rotation and water conservation. Fertiliser production should coincide with the expected native demand.

Thus from the native peoples' present subsistence economy it is hoped to produce a cash economy and encourage progress, a progress which in no small part would be due to Rhodesia's growing chemical industry, and to those UK chemical concerns who have helped the industry in the first place.

VANADIUM POISONING IN BOILER CLEANERS

FUEL OIL used in boiler-houses is the residual fuel remaining after the refining of crude oil. It contains vanadium in varying amounts—0.01 to 0.03 per cent calculated as vanadium pentoxide. The soot from this fuel is strongly acid and may contain a great deal of vanadium, the amount depending on the source of the oil. Venezuelan and South American oils generally may contain up to 45 per cent. Middle East oil contains about 14 per cent and Wyoming, US, oil ash contains only a trace. In fact over 20 tons of vanadium pentoxide is recovered annually from soot which collects in the boilers and smoke stacks of ships burning South American oils.

Source of the vanadium in crude oil is believed to be the fossilised remains of certain sea-squirts and sea-cucumbers (up to 10 per cent of vanadium is contained in the blood-pigment of these creatures when alive).

Today, oil-fired boilers are replacing those fired by coal or coke and lately there have been several cases of vanadium poisoning in men engaged in cleaning such boilers. The men have, after removing the superficial layers of soot, to scrape off the deeper layers by brushing and scouring with wire brushes, which procedures cause clouds of highly irritant dust.

Early symptoms of vanadium poisoning usually develop within a half to one hour of starting work and consist of a running nose, sneezing, watering of the eyes, soreness of the throat, and chest discomfort. Later symptoms usually develop within 6 to 24 hours and consist in tightness of the chest and wheezing, epigastric discomfort, dyspnœa on slight exertion, and mental depression. Generally there is a dark green discoloration of the tongue which fades two or three days after exposure to vanadium is discontinued. The symptoms persist for three or more days with shortness of breath for about a week. Vanadium is excreted in the urine, where its presence provides useful confirmatory evidence of exposure.

The problem of vanadium poisoning is likely to become of greater importance as oil-fired boilers are replacing those fired by coal or coke. Therefore, men exposed to vanadium pentoxide dust should have adequate protection. Methods of prevention of poisoning have been discussed in the *British J. Industrial Medicine* from time to time. It has been suggested that dust respirators or full-face masks with air lines attached should be used. Water sprays have been advocated during dismantling of firebrick walls, but a highly acid solution is formed which can cause skin irritation. Waterproof clothing and gloves should therefore be worn. In smaller boilers, of course, vacuum cleaners could be used to remove some of the soot.

In the main, however, recognition of the dangers of vanadium poisoning should be of first importance. Hitherto, it appears that vanadium poisoning has only infrequently been recognised.

New Laboratories For Marchon

Research and Development Work to be Centralised in New Building

RESEARCH and development work on household and industrial detergents, fatty alcohols, complex phosphates, sulphuric acid, commercial phosphoric acid and cement will be intensified when new research laboratories, now nearing completion, are fully commissioned at the Whitehaven works of Marchon Products Ltd. All research work, which hitherto has been done in parts of smaller laboratories, mainly engaged on quality control and routine testing, will be centralised and co-ordinated.

The new laboratories occupy the ground floor of a new three-storey building designed, built and equipped by the firm's civil engineering section.

Constructed on the highest part of the 250 acres site occupied by Marchon Products and their subsidiary company, Solway Chemicals Ltd., the new building has a total floor area of about 16,000 square feet, of which the laboratories and ancillary rooms occupy 3,250 square feet.

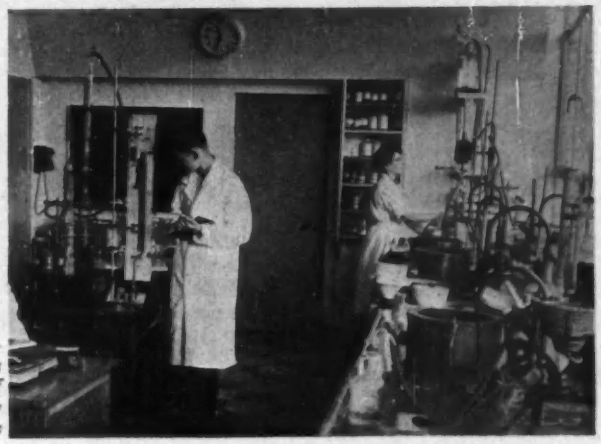
Five Laboratories

There are five main laboratories: (1) fundamental research (initially on detergents); (2) testing and confirmation of work done in laboratory 1; (3) analytical; (4) heavy duty work, operation of test plant prior to the pilot plant stage; and (5) inorganic research. Ancillary rooms include a photographic dark room; balance and apparatus room; workshop with glass-blowing equipment; glass store; and drying room.

A staff of about 30 will work under the direction of the research manager, Dr. A. Koebner, whose chief assistants are Mr. B. Milling, development chemist, Mr. W. B. Smith, research chemist, and Mr. E. Sowerby who is in charge of scaling-up of laboratory processes.

Except for the analytical laboratory, which has peninsula bench arrangement, benches are fitted to the walls and have lead gutters and splash backs. Benches are raked almost imperceptibly so that any acid spillage can be quickly and safely drained away via the lead guttering. Protective lead is used extensively in the drainage arrangements and all pipes are concealed in covered ducts.

In order to facilitate working arrangements, each laboratory has a central service island, a table from which gas, water and electricity can be supplied to any workpoint for any equipment the chemist wishes to set up. When a CHEMICAL AGE reporter visited the laboratories, the service island points had been used to operate a Tergetometer, an instrument for measuring detergency power. All gas, electricity and water leads are taken through ducts in the floor and the ducts covered with 'purple heart' timber, which is particularly acid resistant.



Fundamental research is done in this laboratory, one of the five opened by Marchon Products

Big capacity fume cupboards, specially designed and highly efficient in operation, provide a natural division between laboratories. There are two pairs of these cupboards, each with a capacity of 480 cu. feet. Each cupboard has two doors and is exhausted by a fan with a capacity of 3,400 cu. feet per minute. Gases are drawn away through a 12-inch diameter flue which is connected to a 14-inch bifurcated exhaust plant in the roof. The fan is set in p.v.c. For high duty and acid resistance, the flue pipes are lined with asbestos and with cashew resin cement. The chambers are exhausted seven times a minute.

In all aspects of design and decor attention has been given to convenience and to pleasant working conditions. Tables in the central floor area and splash backs are finished with turquoise Formica. Flooring is of two-tone green mottled p.v.c. tiles, except in the heavy duty laboratory where buff quarry tiles have been used. In this laboratory there is a low bench constructed in lead, on which heavy equipment can be assembled.

Concealed Services

Service lines and feed pipes are concealed in the ceiling and are easily accessible by removable panels and are identified by a colour code system. Additional service lines can be introduced as required.

Hot water is supplied from boilers in the nearby engineering shop and is fed through a steam pipe to a calorifier. When space heating plant is not in operation, hot water is supplied by an immersion heater. Space heating in the laboratories is by forced air flow convectors.

On the first floor of the new laboratory building is a well-equipped library. On the second floor is a large drawing office where much of the work is concerned with the translating of data prepared in the laboratories into plant for pilot and full-scale operation.

Marchon Products started manufacturing surface active agents and detergent intermediates at Whitehaven in 1939. By 1950 a small business had grown into an important chemical manufacturing organisation and had built up an extensive home and export trade in detergents and detergent raw materials. Being large consumers of sulphuric acid and being isolated from the principal sources of supply, the company required some convenient and permanent source of supply. Rather surprisingly it was found that the works were built above what is probably one of the largest seams of anhydrite in the country. Anhydrite is mined from 400 feet below the surface and output is now 1,000 tons per day. This is taken by conveyor to the sulphuric acid plant of Solway Chemicals.

Main Plant Sections

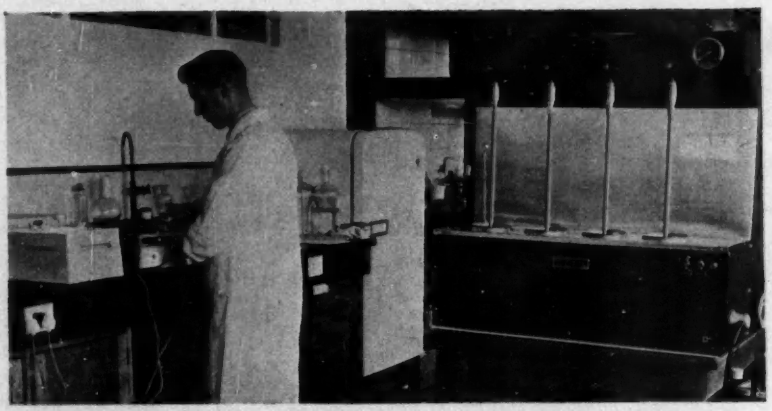
Main sections of the Marchon plant are:

(a) Primary fatty alcohols and alcohol sulphates. The plant can use as raw materials vegetable oils, tallow, fatty acids or fatty acid esters. These are converted to the corresponding alcohols by high pressure hydrogenation in the presence of a copper chromite catalyst and are distilled in a Dowtherm heated fractionating column under high vacuum.

(b) Phosphate plant. This is designed to make phosphoric acid and other phosphate-containing products. Phosphate rock is imported to Whitehaven docks from North Africa. The *Marchon Trader*, which has been specially built for the company to carry phosphate from North Africa to Whitehaven (see CHEMICAL AGE, 8 June, p. 975), is now fitting out at a Sunderland shipyard and will be in service shortly.

Among the surface active agents manufactured are 80 per cent active dodecyl benzene sodium sulphonate flake, spray dried built and unbuilt synthetic detergent, 40 per cent active alkyl aryl sodium sulphonate powder and concentrated liquid synthetic detergents. There is also the Empilans range which includes condensation products of fatty acids and fatty alcohols.

The fact that only 90 of the 250 acres owned by Marchon Products is developed gives some idea of the potential. Further expansion of the products manufactured and the introduction of new products



Part of the new research laboratories at Whitehaven. In the foreground is the Tergetometer which measures detergency power

allied to those already produced at the plant are under consideration. The new research laboratories will play an important part in these new developments.

Executive personnel at Marchon Products, Whitehaven, are: Mr. F. Schon (chairman); Mr. F. Marzillier (administration and finance, joint managing director); Mr. A. C. Halfpenny (production, joint managing director); and Mr. O. Secher (sales director). Chief chemist is Mr. R. C. Dickie; his deputy is Mr. K. F. Coles.

Union Carbide Plan £3m. Fawley Unit for Ethylene Oxide Derivatives

SUBJECT to approval by local authorities, Union Carbide Ltd., 103 Mount Street, London W1, plan to erect a £3 million plant at Fawley for the production of ethylene oxide derivatives. This was announced on 21 August by Mr. William B. H. Gallwey, chairman, who added that the output of the unit would contribute to the expanding activities of Union Carbide Ltd., a UK affiliate of Union Carbide Corporation of the US.

Esso Petroleum Co. Ltd., who operate the nearby Fawley refinery, are to supply the new plant with ethylene, which will be converted into a number of ethylene oxide derivatives. The plant is scheduled to be operative in 1959, with production capacity of 45 million pounds annually. Manufacturing facilities will include installations for the production of ethylene oxide, ethylene glycols, polythene glycols, ethanolamines, glycol-ethers, and specialised products including polyglycol ethers, polyglycol esters, and other surface-active agents. Provision has been made for the storage of large quantities of finished products, and extensive facilities are planned to speed incoming and outgoing transport.

Some of the principal uses of the chemicals to be manufactured include: anti-freeze for cars; manufacture of synthetic fibres, textiles, printing inks, pharmaceuticals, cosmetics, detergents, agricultural chemicals; as solvents in paints and lacquers; components in brake fluid formulations; rubber mould lubricants; and as absorbents in petroleum refining.

Plans call for total site area of 52 acres. The initial facilities will cover 25 acres, leaving space for future substantial expansion. The most modern specialised chemicals processing equipment permitting a high degree of automation is a feature of the installation. Engineering studies have been completed and plant design is now in its final stages. When completed, the unit will employ over 150 people.

The Fawley plant is the second major petrochemical facility in the UK under construction by the Union Carbide organisation. A 24 million lb. per year polythene plant at Grangemouth, Scotland, is scheduled for completion in October of this year.

Union Carbide Ltd. already manufacture a variety of industrial products in the UK including ferro-alloys and electro-metallurgical products through its alloys division, chemicals through its chemicals division, and barium getters through its Kemet division. An affiliate of Union Carbide Ltd., British Acheson Electrodes Ltd. are a major producer of carbon and graphite electrodes, speciality products such as Karbate, and impervious graphite in which connection they are the sole suppliers to the UK Atomic Energy Authority. The Union Carbide organisation is said to have developed more than one chemical per month on the average during the past 25 years.

George Wimpey and Co. Ltd., London W6, have been appointed contractors for the building, civil and mechanical work on the entire Fawley project, the basic design of which is to be supplied by Union Carbide Corporation.

Polythene Plan Approved

Plans for £750,000 of site preparation at Grangemouth airfield for the building of a polythylene manufacturing plant were approved at Grangemouth Dean of Guild Court on 6 August. The plant is part of British Hydrocarbon Chemicals expansion programme for the petro-chemicals industry at Grangemouth.

Atomic Radiations Used for Controlling Titanium Furnace

GAMMA RAYS from radioactive cobalt are being used to detect and control the level of molten titanium in a new 'cold hearth' arc furnace designed to prepare the purified titanium metal. The titanium furnace in question is a major installation at the Westinghouse metals development plant of Westinghouse Research Laboratories at Blairsville, Pennsylvania, US. The penetrating gamma rays pass through as much as 15 inches of solid metal.

Successful operation of this new titanium arc furnace requires exact control of the molten surface of the titanium ingot inside it, which must be accomplished under very difficult conditions (e.g. a temperature of more than 3,000°F.). By beaming the gamma rays through the walls of the furnace and the 12-m. titanium ingot inside it, the actual level of the titanium can be noted. This information is required to automatically raise or lower the ingot to its correct operating level, thereby ensuring proper operation of the furnace.

The Westinghouse investigators consider that the radiation control brings a new degree of reliability and safety to titanium arc furnace operation. The gamma rays passing through the furnace are detected by means of two 'scintillation counters' containing crystals which change the rays into flashes of light. These light flashes are converted into electrical pulses and amplified. These pulses are fed to electronic circuits which drive a hydraulic system that raises or lowers the titanium ingot as desired.

So precise is the system that it is claimed that it can detect and maintain the level of the titanium ingot to within one-hundredth of an inch of its ideal operating condition. If the ingot for any reason moves beyond its prescribed limits the gamma ray control causes immediate shutdown of the furnace.

This type of control can be used, it is stated, on other types of furnace.

ABCM 1957 Directory Now Available

THE 1957 edition of 'British Chemicals and their Manufacturers' has been published by the Association of British Chemical Manufacturers, Cecil Chambers, 86 Strand, London WC2. Copies are being sent to members of the Association, and to chambers of commerce and other representatives of British industry at home and abroad.

Additional copies may be obtained, free of charge, from the Association by any organisation interested in the purchase or marketing of chemicals.

Kanigen at SBAC Show

Test pieces showing the uses of Kanigen plate—the chemical nickel-phosphorus plating process operated by Albright and Wilson—will be demonstrated at the Society of British Aircraft Constructors' Farnborough Show, 2 to 8 September.

The company claim that the application of Kanigen plate eliminates the galling tendencies usually associated with titanium alloys.

UK ATOMIC ENERGY RESEARCH REPORTS NOW RELEASED

THE Atomic Energy Research Establishment has released for sale a series of reports, some from the chemistry division and others from the metallurgical and electronics division. Below are given notes on certain of these reports:

Chemistry division

Fluoride-hydroxide cycle in the purification of plutonium by J. K. Dawson and R. Hurst. (AERE C/M 80, 5 pp., price 1s 3d net.)

Potassium plutonium fluoride—plutonium hydroxide cycle is stated to give very good decontamination from uranium, chromium and iron after four cycles. Separation from the $\beta\gamma$ activity of fission products is not good, but the actual weight present is negligible. It appears that $KPuF_5$ will precipitate equally well from nitric acid or sulphuric acid solutions and also from solutions with very high NH_4NO_3 concentrations. Solution of Pu from the hydroxide in nitric or sulphuric acid was comparatively slow at room temperature; the best method found is to dissolve in a small quantity of hot conc. HNO_3 followed by dilution to the required acidity. It is possible that this whole process could be worked in one vessel, the dissolution of the hydroxide being the difficult step since strong heating cannot be used in a plastic tube.

Solubility of neodymium sulphate in water and in a sodium sulphate solution at high temperatures by C. J. L. Lock. (AERE C/M 301, 6 pp.)

Solubilities of neodymium sulphate in water and in a sodium sulphate solution have been measured by tracer methods up to 270°C. The solubility of neodymium sulphate in water decreased with temperature. At room temperature, the solubility was much less in 1.6M sodium sulphate solution, but at higher temperatures there was very little difference in the solubilities.

Spectrographic estimation of major-constituent plutonium by the iron-flux method by F. T. Birks. (AERE C/R 2081, 8 pp., price 1s 6d net.)

Plutonium has been estimated in solids using a dc arc on copper electrodes after making a 10:1 dilution of the sample with a flux consisting of ferric sulphate and ammonium sulphate. The concentration range covered was 0.5 to 100 per cent PuO_2 and at the 50 per cent level the coefficient of variation was 6.6 per cent.

The index point of equal intensity for the intensity ratio of Pu 2904.3 and Fe 2901.4 was found at 42.2 per cent PuO_2. Equalities with other Fe lines having different intensities may be used in order to obtain a rapid visual estimation of the PuO_2.

Estimation of the major common impurity elements may be carried out simultaneously with the plutonium.

Electronics division

An impurity analysis of aluminium by radioactivation and scintillation spectrometry by P. Iredale. (AERE EL/M 96, 15 pp., price 2s 6d.)

In this report the use of a γ-ray spectrometer in an impurity analysis of aluminium is described. The specimens of aluminium were irradiated in a flux of thermal neutrons and the identities of those impurities producing γ-rays when activated were established by measurements of γ-ray energy and of half life. In this way small amounts of impurities were detected while avoiding chemical separation.

Metallurgy division

Metallurgical investigations of sodium heat transfer rig by A. G. Ward and J. W. Taylor. (AERE M/M 148, 18 pp.)

A study has been made of the attack of stainless steel and nickel by sodium, both oxygen-free and contaminated, at temperatures in the range 300°–600°C. in static and dynamic tests. A number of miscellaneous metallurgical investigations on components taken from a stainless steel/nickel double annulus heat exchange rig are also reported.

Under the conditions of test, stainless steel of the 18 Cr–8 Ni type containing free carbide, undergoes considerable attack, both in static and dynamic tests in sodium nominally free from and also heavily contaminated with oxygen. From the evidence available it is suggested that the mode of attack consists of a decarburising action which proceeds intergranularly and modifies the spheroidal carbide in the affected region by diffusion of this phase into the matrix. Under similar test conditions nickel undergoes no detectable corrosion even at the highest temperature of test, 600°C.

It is recommended that prior inspection be carried out on stainless steel for use in systems containing sodium at temperatures about 300°C., to ensure that the steel specification has been fulfilled and, that the material is devoid of free carbide before use.

New Humphreys & Glasgow Laboratories

IMPORTANT items to be studied in the laboratory recently opened by Humphreys and Glasgow Ltd., at Billericay, Essex, will include gas purification and developments in catalytic oil gas making. Work on the new methods of gas making will also be carried out, together with short-term investigations arising from the company's entry into the chemical process field.

Space and services are available in the new building for tests not only on the laboratory scale, but for larger apparatus which could, if required, be transported complete to a works for further tests. Modern laboratory equipment is provided for all aspects of this work.

The laboratory adjoins the main building on the site, which houses a large store for engineering equipment used by the company's construction teams in the field. The main building also contains a plant for processing and treatment of catalyst for the company's Onia-Gegi oil gas process in which gas with characteristics similar to normal town gas is produced in one stage from heavy fuel oil or any other liquid or gaseous hydrocarbon.

Humphreys and Glasgow were founded 6½ years ago to bring the carburetted water gas process to Europe from the US. The company's activities now include underground gasification of coal (for the National Coal Board), mechanical handling, chemical engineering and the marketing of small nuclear power plants.

Design of the buildings was by Mr. Hubert Evans, F.R.I.B.A. The laboratory was planned according to the requirements of Dr. R. H. Sapiro, Humphreys and Glasgow's chief chemist. Mr. R. S. Craig is in charge, under Dr. Sapiro. Furnishings and much of the equipment were provided by Griffin and George Ltd.

Exemption from French Taxes

DETAILS of the recent changes in French import taxes, mentioned in last week's issue, have now been released.

The following is a list of 'basic raw materials' that have been exempted from the 20 per cent import tax introduced on 11 August. Customs Tariff numbers are given in brackets.

Iron pyrites, unroasted (25.02), sulphur of all types but excluding sublimated, precipitated and colloidal sulphur (25.03), refractory and sandstone bearing earths including chamotte and dinas earths (ex 25.07), dolomite agglomerated (including tarred dolomite—ex 25.18, subsection B).

Mineral ores (ex 26.01, subsections A, B, H-M) as follows: iron ores (A), manganese ores including magnaniferrous iron ore with a manganese content of 20 per cent or more (B), cobalt ores (H), chromium ores (I), molybdenum ores (J), tungsten ores (K), titanium ores (L) and other ores (M).

Coal gas, producer gas and water gas (27.05 bis), pitch and pitch coke of tar, coal and other mineral tars (27.08).

Crude petroleum and shale oil (27.09), light and medium oils, gas oils, domestic fuel oils, light fuel oils, heavy fuel oils (ex 27.10, subsections A–H).

Chromium oxides and hydroxides (28.21), vanadium pentoxide (ex 28.28), aromatic hydrocarbons; xylenes and paraxylenes (ex 29.01, subsection D), aromatic polyacids; phthalic acids, their salts and their esters; terephthalic acid, its salts and its esters (ex 29.15, subsection Ex B).

Paper pulp: bleached chemical pulp for artificial textile fibre production (ex 47.01).

Certain pig iron, iron and steel products (73.01 to 73.20), tungsten (wolfram) wrought or unwrought (81.01), molybdenum wrought or unwrought (81.02), other base metals, wrought or unwrought (ex 81–04, subsections B–E, H, I,) as follows: cadmium (B), cobalt (C), chromium (D), manganese (E), vanadium (H), others (I).

This list also applies to imports into French overseas Departments and territories.

★ THE first self-sustained chain reaction at Dounreay began last week when an assembly of a solution of uranium reached its critical performance. The UK Atomic Energy Authority tells Alembic that this formed part of an experiment into the properties of solutions which might be employed in chemical plant. The work, being carried out by the authority's research and development branch, has no direct bearing on the atomic power programme but is part of the large programme of safety precautions.

When the two reactors at Dounreay are on stream a large factory will be working on chemical operations on the spent fuel elements. Another unit is already working on the fabrication of fuel elements from raw uranium.

★ ALEMBIC has now received further details regarding the US food processing industry and food and drug administration talks in Washington (see CHEMICAL AGE, 3 August, p. 171). It is suggested that as a result of the House Subcommittee's re-opened hearings on chemical additives in foods, the food processing industry and FDA officials show signs of yielding on past rigid positions.

Chemical additive producers are stated both to lose and to gain by the results. They have gained in as much as FDA has given up its insistence that a new law would bar additives that lack a 'functional value' in foods. They are said to have lost, however, support of the powerful food processing group in their insistence on a full court review.

Mr. Charles Wesley Dunn, speaking for grocery manufacturers of the US, has hinted that food makers will not insist on trial procedure on questionable additives. He is stated to appear satisfied that industry would be protected against arbitrary rulings by FDA if the agency relies on independent scientists to advise on safety issues, as FDA has proposed.

US feeling is that Congress will not act on additive bills until next year. The reason suggested is that it will require more scientific data first.

★ THERE is more than one way of catching your fish than the time-honoured one of rod, line and patience. But even the salmon-poaching barbarians who have adopted the unpleasant practice of using explosives would be surprised at the methods of Dr. Richard Vollenweider, 35-year-old Swiss scientist. He is currently using one of the radioisotopes, carbon 14, to find out how the Nile ponds can be made to yield more fish.

Working at the Institute of Hydrobiology at Alexandria with Egyptian scientists and a team from the UN Food and Agriculture Organisation, his first aim is to raise the production of algae to ensure an increase in plankton and, hence, fish. The process of using carbon 14 to measure the activity of algae was first developed in 1951 by Mr. E. Steemann Nielsen of Denmark, and although much work has been done with it the Egyptian venture represents the first attempt to use it with the practical aim of raising fish production.

First stage in the process is to add radioactive carbon 14 to the water of a pond. The radioactivity of the algae is measured about 24 hours later and a calculation made of the quantity of glucose produced by the algae. By changing the composition of the water, by building dams or adding mineral salts, the production of algae can be raised. New measurements with carbon 14 can then be used to determine if the algae are producing more glucose than in the past.

★ DOES Sir Miles Thomas want the US to be first in the chemical industry but second in the field of aircraft? This question was put to Sir Miles on the BBC TV programme 'Press conference' last week shortly after the Air League of the British Empire, of which he is chairman, had issued its much publicised report.

Sir Miles replied 'No, I want to see that Monsanto Chemicals have a very prosperous business in enterprise in this country'. In a refreshing half-hour of a number of direct questions, Sir Miles was seldom at a loss for a reply, whether giving advice to young men who want to reach the top (more opportunity with private enterprise than a State board) or on how he made his first £100,000 (which came by a combination of applied effort and the undertaking of great responsibility). Capital, said Sir Miles, gave one the security to go from one job to another.

The principles of running BOAC or a large chemical concern were basically the same, and of vital importance was the need to consider human relationships. Asked whether there was any common denominator between the top jobs he had held, Sir Miles said that they all represented an element of seized opportunity.

★ THE chemicals supplement published recently by *The Financial Times* contains some interesting figures on production research and sales, although none of them are particularly new. They are, however, published in convenient form. Alembic sees that since 1948 the chemical industry has spent just over £500 million on investment, last year's total being about £100 million. By the end of 1958, estimated UK investment in petrochemicals plant will be £90 million.

Dr. F. Roffey, director of research for the Distillers Co., maintains that the UK chemical industry is spending more than 2 per cent of its total production value on research and development, or roughly twice that for manufacturing industry in general. The rate of increase of production in the chemical industry is over twice that of manufacturing industry as a whole; so there is obviously a close link between the productivity and expenditure on plant and research.

Dr. Roffey gives the chemical industry's expenditure on research and development as £17.5 million in 1956, £11.2 in 1952 and £8.5 in 1948; the industry's production in those years was valued at £700–£750 million, £520 million and £323 million respectively.

In an article on petrochemicals, the authors (F. E. Salt and Dr. H. K. Whalley of the Distillers Co.) consider the materials already made from other raw materials which could be made in the UK from petroleum as is the case elsewhere. These include: acetylene, acetic acid and acetic anhydride, glycerol, hydrogen peroxide, phthalic anhydride, isophthalic acid, phenol, sebacic acid and acrylonitrile. Phthalic anhydride is included in the list, but this has been produced in limited quantities by Petrochemicals at Partington for some time.

★ ALEMBIC read with interest the proposals of the US chemical industry to 'promote certainty, speed and efficiency' in the enforcement of the Federal Anti-dumping Act. British chemical manufacturers who have read these suggested amendments, summarised on page 296, will no doubt wish that the UK regulations rightly described as 'milk-and-water legislation', contained similar 'teeth'.

Of particular interest is the US aim to eliminate the practice of foreign producers adopting unusual nomenclatures for chemicals. This is most likely to occur where something improper, such as dumping or under-valuation is attempted and an effort at concealment is made. This loophole can be closed by requiring the invoice to state the designation by which the merchandise is known both in the country of origin and of destination.

The determination of what is a 'fair value' is one of the points of controversy in the UK legislation. At present US law employs two terms 'fair value' and 'foreign market value'. This apparently makes the regulations extremely difficult to apply and it is proposed that in future the only yardstick in determining dumping should be the 'foreign market value' (or where it cannot be determined the 'constructed value').

If anti-dumping legislation is to be of any practical use, great care must be taken to define all terms used. The US chemical industry clearly recognises this fact in a number of the proposals it has made.

Alembic

Acetylene—Production and Uses

Part I: Present-Day Methods of Commercial Production

By
S. A. MILLER
and
J. A. TEBBOTH
of
British Oxygen Research and Development Ltd.

ACETYLENE is a highly endothermic compound, as can readily be seen from the reaction

$2C+H_2 \rightleftarrows C_2H_2$; $\triangle H_{298} = 54.194$ kcal.

It is not surprising therefore to find that this commercial production involves temperatures of the order of 1,000–2,500°C. However, acetylene cannot be made directly by the above reaction, since at equilibrium at these temperatures it is largely dissociated to the elements. Commercial production of acetylene therefore was first established via calcium carbide produced by the reaction $CaO+3C=CaC_2+CO$; $\triangle H_{298} = 110.8$kcal. This reaction proceeds to completion by allowing the carbon monoxide to escape, and calcium carbide is stable at the reaction temperature of 2,000–2,500°C. The addition of water to the carbide provides a gas containing some 99.5 per cent of acetylene.

All hydrocarbons are less stable than acetylene at temperatures above 600°C., and this provides a second source for the commercial production of acetylene. The rate of decomposition of these hydrocarbons exceeds the rate of decomposition of acetylene only above 1,000°C., and only at these higher temperatures are the equilibria favourable. In order to isolate the acetylene formed, very brief contact times of 0.001–0.01 sec. are employed; and it is imperative to limit the partial pressure of acetylene by the use of diluents or by reduction in total pressure. The rate of decomposition of acetylene is appreciable even at 400°C., so that it is not unusual to quench the products of hydrocarbon cracking. It should also be realised that the cracking reactions are complex, and that the gas made only contains a minor proportion of acetylene, e.g. 5–25 per cent by volume.

Choice of Commercial Route

The choice of commercial route is not a simple one, and it is first desirable to consider the various processes involved to understand why installations providing acetylene both by the carbide route and by the hydrocarbon route are being put up at the present time.

The Electrothermal Process for Calcium Carbide. This requires electric power, limestone, and carbon. Limestone of high purity is needed, which after burning will give a product containing at least 95 per cent CaO, and which is preferably very low in magnesium and phosphorus compounds. In many installations the bulk of the carbon used is in the form of coke, which has not only to be of sufficient mechanical strength to withstand crushing and so maintain the free escape of product gases through the charge, but must also have suitable electrical conductivity.

Certain of the impurities in the limestone and coke are reduced to the metal under reaction conditions, and this involves increased consumption both of carbon and power. With good commercial materials, and taking into account the energy losses in slag reduction, the sensible heat of the products, and electrical and heat losses, the gross energy requirement is about 3,900 kWh. per ton of 100 per cent equivalent calcium carbide, i.e. about twice the energy calculated for the heat of reaction at 25°C.

Commercial production of calcium carbide is carried out in installations producing 50,000 tons per year and upwards of carbide of 80-84 per cent purity, the rest being chiefly free lime. Relatively modern developments have been the use of closed furnaces which are slowly rotated to settle the charge, and in such furnaces the carbon monoxide may be recovered and used in the lime kilns. Because of the heavy demand made by the process on electric power, the large commercial installations must be sited where such power is normally available and at the lowest price. At the same time, however, if limestone and coke of suitable quality are not available at the same site, they have to be transported, so that the correct siting of a commercial installation is not necessarily close to the source of electrical power.

The Oxygen Process for Calcium Carbide. The energy required for the reaction between lime and carbon may also be supplied by the combustion of coke. To reach the temperatures required the combustion must be carried out in oxygen-enriched air, but the use of oxygen itself has the advantage that the product gas is virtually pure carbon monoxide. The reaction may be carried out in conditions resembling those in the blast furnace, such that the incoming coke and lime are preheated by the hot carbon monoxide.

Coke consumption in this process is very high, and about 7 to 10 times as much carbon monoxide is formed as in the electrothermal process. Because of the large coke consumption, coke quality is important in limiting both the energy loss due to slag-reduction, and the slag content of the carbide produced. The economics of the process depend to a large extent on disposal of the carbon monoxide produced.

Conversion of Calcium Carbide to Acetylene. Chief advantage of the carbide route to acetylene is that the addition of water to the carbide followed by a very simple purification system results in acetylene of 99.5 per cent purity, and with inert nitrogen as the major impurity. Calcium carbide can therefore be regarded as an easily transportable form of acetylene, which in certain circumstances can be cheaper than the transport of acetylene itself dissolved in acetone in steel cylinders, or distribution by pipeline.

Acetylene from Hydrocarbons. The conditions in which acetylene may be produced from the cracking of hydrocarbons have been cited earlier, and many processes have been suggested to obtain these conditions. Thus the high temperature required may be produced electrically, or by direct or indirect combustion with air or oxygen.

Electrical Processes. Principal electrical processes are the Hüls flaming arc process, the Schoch silent discharge process, and the submerged arc process.

Hüls Process

In the Hüls process, an arc is struck in a stream of gaseous hydrocarbon in conditions such that a gas temperature of about 1,900°C. is achieved for a very brief period terminated by a quench with water sprays, the cracked gas produced containing about 15 per cent of acetylene. In the Schoch process one of the electrodes is stationary, while the other takes the form of a gas blower rotor. A gaseous hydrocarbon can therefore be subjected to the discharge for a very brief period, and the products thereafter quenched. Cracked gases containing 10 per cent of acetylene have been obtained using natural gas as feedstock. In the submerged arc process, an arc is struck between fixed and moving electrodes below the surface of a liquid hydrocarbon. In the immediate vicinity of the arc the hydrocarbon is cracked to gas, thereby interrupting the electrical contact. The very hot products of cracking are immediately quenched by the main body of the liquid hydrocarbon from which the heat has to be removed. Because liquid hydrocarbons have a higher carbon content than gaseous ones, less hydrogen is formed in the cracking process, and the cracked gas can contain 25 per cent of acetylene.

It has been found, however, that the electrical power consumption in these three processes is considerably greater than that required for making acetylene by the electrothermal carbide process, and this may put the electrical cracking processes at an economic disadvantage. Only the Hüls process is known to be in commercial operation, and it is one part of an integrated chemical scheme in which use is made of the off gas left after acetylene has been separated.

Direct Combustion Processes. A flame provides an elegant way of raising a gas to a high temperature for a brief period of time, and therefore acetylene may be isolated by burning a hydrocarbon in a

deficiency of oxygen or air. The products of cracking are, of course, diluted with the products of combustion (and with nitrogen if air is used) so that the acetylene content of the product gases does not normally exceed 8 per cent even in the most favourable cases. The use of oxygen instead of air makes for greater flame stability.

This type of process is exemplified by the Sacchse process, in which hydrocarbon and oxygen are separately preheated, mixed, and then passed through the channels of a special refractory burner at a speed greater than the flame speed of the mixture, so that the flame is stabilised within a zone bounded by high temperature refractory material, and where the tip of the flame is quenched with water sprays. Maximum yields on feedstock of about 30 per cent, and maximum economy of oxygen is achieved by preheating, but the extent to which this may be done is limited by the spontaneous ignition temperature of the hydrocarbon employed. Since methane has the highest spontaneous ignition temperature it is quite a suitable feedstock. With higher hydrocarbons, and particularly with those which have a dual ignition range, the amount of preheat is more limited, and many patents have been proposed to avoid a premature ignition, which can lead to destruction of the burner.

Use of Quench

The use of a quench in the process necessitates considerable loss of heat, and the use of a gas turbine in conjunction with the process has been investigated in this country and in the US but no commercial application has so far emerged. The loss of heat is of less importance where feedstock such as natural gas is available at a very low price. For this reason several very large installations are in commercial operation in the US, while others are in building or projected. The process is also favoured where the principal reaction products, carbon monoxide and hydrogen, are also required, e.g. for conversion to methanol, etc.

Indirect Combustion Processes. In these processes hydrocarbons are cracked by contact with hot brickwork for a brief period, and after the acetylene has been separated, part of the residual gas is used to restore the temperature of the brickwork in a separate combustion cycle, in which any carbonaceous residues from cracking are also burnt.

In the Ruhrchemie process, taken to pilot scale during the early years of World War II, the furnace consisted of stacked alumina tile which was heated to 1,600°C. by combustion of fuel gases with air, the waste gases being used for steam raising in a conventional waste heat boiler. The furnace was then pumped down to 0.1 atmospheres, and methane cracked in the absence of any diluent at this low pressure. The cracked gases were quenched and contained about 10 per cent of acetylene.

Similar in character is the Wulff process and its present form is the culmination of development work undertaken over the last 30 years. A demonstration plant now in operation produces 500 tons of acetylene per year. Alternate cracking and re-heating cycles take place in a pair of furnaces with special alumina brickwork, the hydrocarbon being cracked at 1,150°C. and at a pressure of 0.5 atmospheres with steam as diluent. The furnace design permits heat recovery from both the cracked and combusted gas streams, and in consequence the process has relatively high thermal efficiency. Better results are obtained with the higher hydrocarbons than with methane. Thus single pass treatment with propane is claimed to give a 30 per cent acetylene yield, and if a certain amount of recycling is done of the off gases, the yield rises to 40 per cent. The acetylene content of the cracked gases ranges from about 15 per cent with single pass working to 10 per cent for the recycle process. The Wulff process can be so arranged as to be independent of a source of electrical energy, and so could find application in areas where no large-scale electrical supply exists. Furnaces similar to those used in this process are also being used to reform hydrocarbons to fuel gases similar to town's gas by the related Koppers-Hasche process. Any surplus off gases from the Wulff process can also be used as a substitute for town's gas.

Isolation of Acetylene from Cracked Gas. The complexity of cracked gas depends to some extent on the process but that from the Wulff process will serve as an example.

Wulff Process Gas. Vol. per cent

(a)		(b)		(c)	
Acetylene	9–10	Ethylene	6.0	Paraffins	15–20
Propyne	0.6	Other olefines	0.6	Carbon monoxide	8–10
Diacetylene	0.1	Aromatics	1.0	Hydrogen	50–60
Other acetylenes	0.6	Carbon dioxide	1.5	Nitrogen	2–5

While it is possible to isolate pure acetylene from such a gas by a variety of methods, commercially this is done using a selective solvent. The constituents may be divided into three groups, (a) those more soluable than acetylene in the solvent, (b) those with a limited solubility in the solvent, and (c) those that are virtually insoluble. Treatment of the cracked gas with the solvent produces a solution containing the acetylene and acetylenics, and also some of the olefines and carbon dioxide. Group (b) constituents are then removed by disengagement with acetylene itself. If the dissolved gases are then expelled, acetylene of only 80–90 per cent purity would be formed, so that additional stages are needed to give acetylene of equivalent purity to that formed from carbide.

Minor Concentration

Since acetylene is present in the original cracked gas in only minor concentration, it is commercial practice to compress the cracked gas to 10–15 atmospheres, before treatment with the solvent. Such compression is an important cost factor of the isolation process, which overall is at least equal in cost to the cost of cracking the hydrocarbons to acetylene. Purification of the acetylene produced from the other acetylene may involve refrigeration, which adds further to the cost in proportion to the purity demanded. Obviously if the chemical process for which it is required can use acetylene of the lower purity, isolation costs are reduced. Unlike carbide-derived acetylene, however, where the small (mainly nitrogen) impurity is normally innocuous, acetylene from hydrocarbons may contain higher acetylene or olefines which may interfere in the chemical process using it.

Factors Affecting the Choice of Process. From consideration of the various technical aspects of the processes outlined above, it will be obvious that the choice of route depends very much on the availability of raw materials and power, the purity of the acetylene required, and uses for the by-products made at the same time as the acetylene. Thus, the carbide route will be favoured (a) where acetylene of high purity free from higher acetylenics is required, (b) where power, suitable coke and limestone are all available close to the site of manufacture, (c) and where distribution of carbide followed by acetylene generation is cheaper than distribution of acetylene itself. The hydrocarbon routes will be favoured where (a) hydrocarbons are available at a low price, such as in producing areas, (b) where use can be made of the other products of cracking; further, it would be particularly favoured if an acetylene purity of 90–98 per cent could be tolerated.

At present, known world production of carbide is probably approaching a level of 5 million tons per year, while carbide acetylene going into chemicals may exceed 600,000 tons per year. Hydrocarbon acetylene is approaching the 100,000 tons per year level, due mainly to US production, and is in the main used for chemical production. Even with the growth of hydrocarbon acetylene in the US, however, carbide production continues to expand, although to a smaller extent. It has been estimated that even in 1965, carbide will still provide half the US production of acetylene.

(*To be continued*)

Anglo-Norwegian Agreement on Atomic Energy

THE United Kingdom Atomic Energy Authority and the Norwegian Institute for Atomic Energy have recently signed an agreement for co-operation in connection with the Norwegian Halden Reactor Project. This agreement is the result of the discussions mentioned in the exchange of notes between the United Kingdom and Norwegian Governments which has been published as a White Paper, obtainable from HMSO.

This project is concerned with an experimental reactor, scheduled to start operation early in 1958, which is designed to produce process steam suitable for wood-pulp mills and other industrial uses. The authority have undertaken to supply the initial charge of uranium fuel elements for the reactor. The institute and the authority will also co-operate in a research programme with a view to developing suitable fuel elements for later charges for the reactor.

The agreement provides for the authority to have access to the reactor design and to the operating experience obtained from this important experiment.

Institution of Chemical Engineers

As from 26 November 1957 the address of the Institution of Chemical Engineers will be 16 Belgrave Square, London SW1, BELgravia 3647.

FIRE RESEARCH BOARD'S INVESTIGATIONS IN 1956

Flame Arresting Research Planned

ALTHOUGH the cost of large fires (those involving losses of £10,000 or more) has increased two and a half times since 1930, this cost is related to prices current in 1949. Real fire losses in post-war years have therefore been somewhat less than before the war. This information is given in the 10th Annual Report, 'Fire Research 1956' (published by HMSO for DSIR, price 4s [72 cent US] by post 4s 3d).

Reviewing the work of the Fire Research Station the Board states that in future it will increasingly provide information that will be useful in design of new buildings, in improved codes of practice and in fire prevention.

Complete statistics for 1956 are not yet available, but the number of fires attended by fire brigades in the UK is known to have been approximately 125,000.

Soda-Acid Type

A survey has been made of the condition of fire extinguishers in various buildings. The most common extinguisher was found to be the soda-acid type. On examination 80 to 90 per cent of these were found to be fit for immediate use, with most of the remainder only requiring recharging. Where replacement was necessary (2 to 3 per cent) corrosion or perforation of the container was the most common defect found. Of the two other common types of extinguisher, the pressure-operated water extinguisher and the chemical foam extinguisher, at least 90 per cent were found to be immediately serviceable. The report suggests that the life of an extinguisher, if well maintained, may be anything from 15 to 35 years.

The Committee on Industrial Fires and Explosions has prepared a report on portable detectors of flammable vapours (explosimeters). They remark that there appears to be no simple instrument available which can be used for a complete range of solvents used in industry. Tests made with two instruments, both of which operate by burning the vapours on a heated filament, show, it is stated, the need for investigation of the effects of such vapours as amyl acetate on the filament.

Not enough data is available as yet, it is recorded, regarding the size and siting of relief vents in industrial plant for restricting the damage which may follow explosions of gases in plant.

Although various types of flame arrestors or flame traps are available commercially, information about their capabilities is stated to be derived from past experience of their behaviour in plant. A research programme has therefore begun at the request of the Factory Department of the Ministry of Labour and National Service to investigate fundamental aspects of flame arresting.

Also in conjunction with this last-named department, experimental work has continued on problems associated with the dust explosion hazard in factories.

During the year a total of 64 materials were submitted for test. Those placed in class I (dust that ignites and propagates flame readily, the source of heat required for ignition being small) included an organic pigment, several dyestuffs, meta- and para-nitro-ortho-toluidine, albumen, dusts collected in various machining operations on laminated plastic materials, a synthetic wax, aluminium stearate, sodium stearate, stearic acid, sucrose octa-acetate, carboxy ethyl methyl cellulose, a battery-box mix containing coal, rubber and synthetic resin, carbonyl iron and atomised zinc. Certain dyestuffs were placed in class II (dusts that ignite readily but require a more severe source of ignition than those placed in class I).

In a section devoted to suppression and extinction of fire, fixed spray installations for the protection of pipe work were examined. Where kerosene and gas oil were the liquids used, it was shown that the flow rate at the array required for extinction was approximately 10 to 5 times respectively that required for transformer oil. Protective installations should be designed to have a very efficient detecting system so that the time before spray application is as small as possible; to ensure that bulk of the flow from the nozzles is projected directly towards the tubes; and to use a pressure greater than 50 lb. per sq. in.

Analysis

An analysis has been made of extinction of 150 test liquid fires in open vessels, obtained by cooling the liquid with water spray projected downwards from fixed nozzles on to the liquid surface. Extinction with a given spray was found to be much quicker for liquids with high fire points than for liquids with low fire points. Also, efficiency of the spray increased with its flow rate.

At the request of the Fire Fighting Equipment Working Party, a test has been devised by which the effectiveness of two-gallon chemical foam charges may be measured. Foam made by such appliances was found to be rather stiff and to leave burning pockets of fire. This condition is not considered inacceptable, provided the burning pockets were not large enough to cause the fire to regain its full intensity in 15 minutes.

Compatibility of dry powder extinguishing agents with foam has been investigated to determine the destructive effect of such powders on foam. Time taken for a fire to regain one-third of its original intensity was taken as the 'burn back' time and a graph is included in the report illustrating how this was affected by a commercial dry powder containing magnesium stearate and by a sodium bicarbonate powder containing no metallic stearate. 'Burn back' time was found to be inhibited longest by the powder containing no metallic stearate.

Hazards associated with flammable fumigants such as ethylene dichloride or ethylene oxide have been dealt with. Because of their flammability it has been customary to mix them with other compounds. Ethylene dichloride is usually mixed with 25 per cent carbon tetrachloride. Data obtained indicated that there was little likelihood of the vapour from this mixture being inflammable. The report suggests that there is a trend towards the use of mixtures containing carbon tetrachloride. Vapour concentration of carbon tetrachloride in the atmosphere should be maintained above 3·5 per cent by volume.

Ethylene oxide is usually applied with carbon dioxide. With this mixture hazardous atmospheres may be produced, particularly in semi-tropical climates. Ethylene oxide with methyl bromide has been proposed, since the latter has great penetration powers. As no information was available on the flammability limit curve for ethylene oxide and methyl bromide this has been determined. It is now established that vapour mixtures containing 67 per cent methyl bromide and 33 per cent ethylene oxide will not be flammable, and also that 10.5 per cent or over of methyl bromide in the atmosphere will make it safe, whatever the proportion of ethylene oxide.

Corday-Morgan Fellowship for 1958

THE Corday-Morgan Memorial Fund Executive have announced a Commonwealth Fellowship, open to citizens of any country within the British Commonwealth. This will be awarded for post-doctorate (or equivalent) study in any branch of chemistry. It will be tenable for one year in some part of the British Commonwealth other than that in which the candidate received his scientific education, at any university, research institution, or other place of study approved by the Executive.

The value of the fellowship will be £700 a year, but additional allowances may be granted in appropriate cases for travel, university fees, etc. The appointment will be made by the executive not later than 1 June 1958, and will date from 1 October 1958.

Details of the award may be obtained from the secretary, Corday-Morgan Memorial Fund Executive, at the Chemical Society offices, Burlington House, London W1.

New BS for Testing Cellulose Acetate Flake

THE British Standards Institution have issued a specification for methods of testing cellulose acetate flake (B.S.2880:57).

It specifies test pieces, procedures and the method of expressing results for the determination of moisture content, ash, acetic acid yield, bulk density, sieve analysis, free acidity, relative viscosity of a 1.0 per cent solution at 25°C., and viscosity at 25 per cent concentration at 25°C. cellulose acetate flake.

A separate section of the standard is devoted to the sampling of the material. Copies may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London W1.

US WORK ON LOW TEMPERATURE INSULATION BY EVACUATED POWDERS

ONE of the most important problems in low-temperature technology is that of keeping heat out of low-temperature equipment. In this respect Sir James Dewar's invention, the vacuum-jacketed container with walls of high reflectivity for rejecting thermal radiation, was a very important contribution to cryogenic technique. In a broad programme devoted to developing and improving cryogenic techniques and obtaining engineering data, the cryogenic engineering laboratory of the National Bureau of Standards, has undertaken to improve the Dewar vessel with the aim of developing methods that are adaptable to large-scale equipment.

The best types of Dewars have been found to have a heat leakage by radiation across the vacuum jacket of the order of 1 milliwatt/cm.^{2} between walls with temperatures of 300°K. and 76°K. Leakage by thermal radiation between walls at 76°K. and 20° or 4°K. in the same vacuum-walled flask is of the order of 2 microwatts/cm.^{2} for the very best flasks and usually runs from 10 to 20 microwatts/cm.^{2}. With increase in gas pressure, all the above 'heat leaks' are increased correspondingly.

For large-scale apparatus, marked improvement has been noted over the standard vacuum-walled low-emissivity Dewar vessel, when evacuated powders such as perlite, diamataceous earth and silica aerogel are used. The evacuated powder insulated vessel can have high emissivity walls and very high gas pressure with its usefulness as an efficient low-temperature vessel.

To obtain additional data on powders already in use and to determine properties of powders not previously investigated, M. M. Fulk, R. J. Devereaux and J. S. Schroath of the NBS Cryogenic Engineering Laboratory, studied powder insulation. As a result of these studies, it is reported that reduction of over-all heat leak through powders can be achieved in a number of different ways that can be used separately or in combination.

Total heat transport is lowered, it is stated, by pumping out the gases, by increasing the degree of subdivision, by increasing or decreasing the density of the powders, by adding metallic powders to make the material 'opaque' to thermal radiation, and by disrupting or minimising the amount of crystal structure.

With the methods now available, over-all thermal resistance of a vessel with a 2–3 cm. thickness of some evacuated powders as good or better than a 'high-vacuum' jacketed vessel in the temperature internal of 300° to 76°K. can be obtained.

Single-component evacuated powders find their principal use in vessels for large-scale storage and transportation of liquid oxygen, the NBS workers state. A powder-insulated vessel has now been constructed for truck transportation and short-time storage of liquid hydrogen. This vessel is stated not to require use of a thermal shield cooled by an auxiliary refrigerant such as liquid nitrogen.

Metal powder mixtures permit, according to Fulk and his co-workers, extensions of these applications and should encourage the use of this insulating principle in other applications requiring efficient insulation. Possible fields of application suggested are gas liquefaction and rectification and low-temperature chemical processes.

Packaging of Industrial Chemicals

'A STUDY of the packaging of industrial chemicals' is the programme theme of coming meetings of the West Midlands branch, Institute of Packaging. First papers, to be given on 16 September at the Imperial Hotel, Birmingham, at 6.45 p.m., are on 'The user's viewpoint' by Mr. J. C. McNicol (Dunlop Rubber Co. Ltd.) and Mr. L. S. Eldershaw (Bakelite Ltd.). On 21 October a visit will be made to two large users' factories in the afternoon, followed by members' questions in the evening at the Imperial Hotel, Birmingham. On 18 November a leading chemical manufacturer will give a paper on 'The manufacturer's viewpoint' at the Imperial Hotel.

KID Exemption on Phthalic Anhydride Continued for Another Year

UNDER section 10 (5) of the Finance Act, 1926, the Treasury are

(i) exempting from key industry duty, until 18 November 1957, the following three chemicals: Maleic acid (exempted by a previous order expiring 18 August 1957); maleic anhydride; phthalic anhydride (exempted by a previous order expiring 18 August 1957), and

(ii) continuing until 18 February 1958, exemption from key industry duty of all other articles exempted from that duty by previous orders which expire on 18 August 1957, with the following additions and deletions:

Additions: Ethyl methacrylate (an ethyl ester); *L*-Lysine *mono*hydrochloride.

Deletions: Magnifiers incorporating microscopic pictures; dysprosium oxide; erbium oxide; europium oxide; holmium oxide; lutecium oxide; scandium compounds; terbium oxide; thulium oxide; ytterbium oxide; 4-aminophenol, aminophenol content of which exceeds 97 per cent by weight; *n*-butyraldehyde; *p*-cresol; di-*n*-butyltin maleate; ethylene glycol monophenyl ether (an ethylene glycol ether); R. sulphuric acid.

The order, Safeguarding of Industries (Exemption) (no. 6) Order, 1957, is published as Statutory Instruments, 1957, no. 1458. Obtainable (price 5d net, by post 7d), from HM Stationery Office, Kingsway, London WC2, and branches, etc.

Polythene Lined Pits for Liquid Storage

A NEW and inexpensive method for storing large quantities of water is reported from Dowell, Inc., US. This consists simply of a pit lined with expendable, polythene film.

It is considered that the new type of storage pit will find widespread applications in industries which need temporary storage space for liquids.

The pits are easily constructed by excavating with a bulldozer, with the bottom sloping toward one end. A sump is dug at the point where pump truck intake lines enter the pit, so that nearly all the water can be readily pumped out. The pit is then lined with polythene. For a hydraulic fractioning treatment near Hominy, Oklahoma, a pit, 55 ft. by 75 ft. and about 8 ft. deep, was dug by a bulldozer. Two men lined the pit with polythene film in about 45 minutes. Then water was pumped into it. The cost of the 8,000 sq. ft. of film used was $400 and the cost of digging and refilling the pit was $130. The oil operator received 2,200 bbl. of storage for $530, which is stated to be about the rental cost today for 1,000 bbl. of storage in steel tanks.

Polythene film is flexible over a wide range of temperatures. It is resistant to mechanical damage, weathering and deterioration. The film being used is 0.003 in. thick, and is manufactured in up to 80 by 400 ft. pieces.

'Simultaneous' Conference on High Polymers

A CONFERENCE on high polymers is to be held at Nottingham University from 21 to 24 July 1958. Proceedings will be divided into two sections meeting simultaneously. Main subjects for discussion will be:

Section A (reaction mechanisms and kinetics): heterogeneous polymerisation (including trapped or inactive radicals); and production of graft and block co-polymers.

Section B (physical, thermodynamic and mechanical properties): papers to be related to topics of section A will be specially welcome, but discussion will not be restricted to those materials.

There will be about 20 papers in each section and preprints will be circulated before the meeting. Those wishing to present papers should submit 200–300-word abstracts in English, French or German not later than 31 December 1957. The programme will be selected from these abstracts and papers will be called for not later than 1 March.

Abstracts should be sent to the International High Polymer Conference, The University, Manchester 13.

ICI Extend Transfer Scholarship Scheme

Under an extension of the transfer scholarship scheme, Imperial Chemical Industries will provide three new scholarships to each of the universities of Bristol, Birmingham and Sheffield for the academic year 1956–57. Last year some 50 of these scholarships were made available, their value being based on State scholarship rates.

Overseas News

DISTILLERS' AUSTRALIAN ASSOCIATE TO BUILD VINYL ACETATE PLANT

FOLLOWING a recent agreement with British Celanese, CSR Chemicals Pty., Australia, are to build a £A500,000 plant in Australia for the production of vinyl acetate monomer. British Celanese will provide know-how and technical assistance in the erection and operation of the plant.

Construction is to begin immediately and the plant is expected to be in operation before the end of 1958. Capacity of the proposed plant is not yet known but it is understood it will be adequate to meet Australian demands for some years.

For some time, Australia has imported vinyl acetate for polyvinyl acetate production. Raw materials for the plant will be based in the main on the sugar industry. At CSR Chemicals' present plant at Rhodes, New South Wales, industrial alcohol produced from sugar cane molasses, is converted to acetaldehyde and acetic anhydride. These two chemicals will provide the two raw materials for vinyl acetate.

A 40 per cent interest in CSR Chemicals is owned by the Distillers Co., and the remainder by Colonial Sugar Refinery.

Solvay Peroxide Plant in Italy

A plant for the production of hydrogen peroxide and perborate is being built by the Solvay Group at their Rosignano, Italy, plant. It will be ready to operate in 1959. Electrolytic hydrogen will be used in a process worked out in the Group's own laboratories.

Australian Oxygen Plant

Production is expected to begin next May at the new oxygen/acetylene factory being constructed by Pacific Oxygen Ltd., at Spotswood, Victoria. Annual capacity will be 50 million cu. ft. of oxygen and 15 million cu. ft. of acetylene.

American, Swedish, German and Australian interests are said to be represented on the board.

Canadian Firm Plans Large Expansion Project

Electric Reduction Co. of Canada Ltd., now producing sodium chlorate at Buckingham, Quebec and Vancouver, plan a multi-million-dollar expansion of their facilities in eastern Canada. Dr. D. E. Jones, president, said the expansion is to meet future needs in the weed-killing, pulp and paper industries.

Danish Firm's Reorganisation

Anhydro AS, whose spray driers are handled in the UK by Leonard Smith (Engineers) Ltd., Abford House, Wilton Road, London SW1, have recently carried out some reorganisation in Copenhagen due to expansion of their business. Mr. K. J. Jensen, founder of the company, now becomes chairman, ceasing executive responsibility for day-to-day activities, but remaining as technical consultant. He will give more of his time to technical matters concerning Anhydro AS and the activities of their associated company, Lidano, who produce specialised milk powder products. The two companies share the same offices in Copenhagen.

Mr. K. P. Berthelsen, technical manager since the company was started, has been appointed managing director. Mr. M. E. Knipschildt and Mr. Paul Jensen have been appointed managers of Anhydro.

Search for New Insecticides

A search for new insecticides that will kill flies which have become immune to DDT is being carried out by the Instituto Superiore di Sanita' in Rome by Dr. M. Boccacci and Dr. S. Bettini. Encouraging results have been reported in a series of experiments with iodo-, bromo-, and chloroacetic acids and 20 esters of chloroacetic acid.

US Firms Drop $50 Million Petrochemical Project

The Columbia Gas System and the Commercial Solvents Corporation have dropped plans for a joint petrochemical project that was expected to have cost up to $50 million. The project was intended to produce ethylene, ethylene oxide and other basic petrochemicals. Commercial Solvents have also decided not to proceed with construction of their own modern plant to extract petrochemical raw materials from natural gas.

CIL to Produce New Moisture-Free Fertiliser

A new type of moisture-free fertiliser is to be produced at three of the Ontario plants of Canadian Industries Ltd. by what is known as continuous granulation process. The final result is described as noncaking homogeneous compound fertiliser. The plants are located at Hamilton, Chatham and Ingersoll.

The Ingersoll plant which is operated by William Stone and Sons Ltd., was purchased by CIL last year, and is now operated as a wholly owned subsidiary. Installation of the necessary equipment at each location will begin immediately and is expected to be completed early in 1958.

Linde Installation at Heide for Pure Ethylene

On the site of the refinery of DEA at Heide (Holstein), Germany, a Linde installation for the separation of refinery gases is in operation. Production capacity of the Linde installation is 1,000 tons of very pure (99.8 per cent) ethylene. The first tank-wagon containing 12 tons was dispatched last December to Farbwerke Hoechst AG, Frankfurt-on-Main.

Davison's Catalyst Plant on Stream

Full operation has begun at the new $6 million chemical plant at Davison Chemical Co. Ltd.'s Valleyfield, Quebec, works. The plant produces a synthetic fluid-cracking catalyst for Canadian petroleum refineries and is claimed to be the first in Canada to supply this material.

Low Grade NZ Sulphide Deposits

According to a report from the New Zealand Department of Scientific and Industrial Research, an area of low grade sulphide ore has been discovered six miles north-east of Thames.

Sampling has shown the presence of up to 20 million tons of rock above stream level with a best average of 7 to 8 per cent of sulphur. This is stated to be too low a grade to be worked economically but detailed mining and mineral dressing estimates have not yet been made.

Brazilian Carbon Products Factory

A French company, Cie. de Produits Chimiques et Electrometallurgiques of Paris, is to establish in Brazil a factory to produce carbon products, including graphite and industrial electrodes. The factory will be set up in Jundiai, in the State of Sao Paulo. Initial production targets are 4,000 tons of graphite electrodes and 6,000 tons of paste.

New US Process for Gold-Plating

Gold plating of metals by chemical action has been developed by Baker and Co. Inc., US, refiners and workers of precious metals. The process, which has been given the trade name 'Atomex' is stated to use 35 per cent less gold than conventional electroplating. A denser better-looking plate is stated to be produced. Metal to be plated is dipped into a solution containing fine gold particles, or liquid gold.

J. M. Huber Form International Department

An international department has been set up to handle all foreign business of J. M. Huber Corporation, 100 Park Avenue, New York 17. The department will be responsible for the marketing of Huber carbon blacks, clays, inks, rubber chemicals and pigments, as well as licensing of Huber processes throughout the world, except for the US and Canada. Customers include companies in the rubber, paper, publishing, ceramics, plastics, pesticide and paint industries. The department will be headed by Mr. Peter Schoenburg, export director.

Sincat Build Sicilian Fertiliser Factory

Sincat, members of the Edison Group, are building a factory for the production of chemical fertilisers at Priolo between

Siracuse and Augusta, Sicily. Originally, the yearly output of the factory was scheduled at 100,000 tons, but in view of the discovery of potassium salts beds in Sicily it has been decided to step up this figure to 300,000 tons.

Plans are also in hand for Sincat to build a petrochemicals plant in Sicily which will use crude petroleum from Ragusa and Gela.

Fertilisers in Portugal

Nitrogenous and ammonia fertilisers are to be produced, distributed and marketed by Sociedade Nitratos de Portugal, a new company financed in the main by the Sacor oil refinery, near Lisbon. Another new company, with Sacor as a main shareholder, is Sociedade Portuguesa de Petroquimica. This company will extract gas and ammonia from the waste products of the Sacor oil refinery.

New Acetylene Plant for France

The Société Belge de l'Azote and Marly of Liège have announced that they are to undertake, at Carling (Moselle) on behalf of the Société des Houillères du Bassin de Lorraine, construction of an acetylene factory, part of which will be used in due course for manufacture of acrilonitrile.

The process to be used at the plant is the result of research investigations by the Société Belge.

Explosion-proof Water Analyser

An explosion-proof electrolytic hygrometer has been developed by Beckman Instruments in the US. Used to control corrosion, product purity and process efficiency, this new model is stated to have possibilities of wider application in plant operations.

Proof against explosion is obtained by the indicating section of the instrument being enclosed in an air-free case. Maximum error of 5 per cent for the unit in the 0 to 1,000 p.p.m. range up to 100°C. is claimed by the manufacturers. Copper, brass or 316 stainless-steel flow systems are used for this hygrometer.

Aluminium for Use at High Temperatures

A new aluminium powder produced by the Alcoa Company, US, may allow the use of aluminium at temperatures of up to 400°C. The company reports that aluminium oxide forms on finely divided unalloyed particles of aluminium, strengthens the product, and contributes to high temperature stability when the powder is rolled or forged. The powder is already being used to make parts for jet engines. Other properties indicated are easier manufacture than titanium and higher thermal conductivity than either titanium or stainless steel.

French Production and Consumption of Plastics

A recent estimate of the consumption of plastics materials in France suggests that about 2.5 kg. is used per inhabitant. In England the figure is estimated at 4 kg. per head, at 5 kg. in West Germany and 8 kg. in the US.

Polyvinyl chloride still occupies first place in plastics materials. Production of principal plastics materials is indicated for France in 1956 as follows (the corresponding production in 1955 is given in brackets, and all figures given represent tons): polyvinyl chloride, 40,600 (32,000); aminoplastics, 3,700 (2,700); cellulosic derivatives, 5,600 (4,800); polystyrene, 17,100 (11,600); vinyl acetate, 5,500; phenol plastics, 10,000 (9,750). Total production of synthetic resins increased by 24 per cent in 1956 compared with 1955 and reached 103,000 tons.

DECHEMA Annual Report

Annual report on the 1956 operations of DECHEMA (Deutsche Gesellschaft für chemisches Apparatewesen, Frankfurt) states that the association and the Max-Buchner-Forschungsstiftung, which is managed on an honorary basis by DECHEMA, contributed about DM 158,000 to promote research and development in 1956. The activities of the Max-Buchner-Forschungsstiftung are covered in the report and it is stated that a grant of DM 57,550 was made in 1956 towards the cost of 18 research programmes, the results of which are summarised.

US Titanium Trichloride Supplies and Prices

Titanium trichloride is said to be available from Stauffer Chemicals, US, at $3.50 per lb. in 30,000-lb. lots. The new price structure and large-size deliveries indicate that Stauffer's pilot-plant operation is a sizeable one. Also, since this catalyst is being produced in such large quantities, it is considered in the US that commercialisation of isotactic polyolefins is now firmly established.

New Jersey Zinc Inc. have just offered this catalyst at $5 to $10 per lb. 'in multi-pound quantities' and Ti Cl_3—also a polymerisation catalyst—at $15. A third US company, National Lead, quote no prices, but provide Ti Cl_3 for evaluations.

Titanium trichloride is believed to be produced by New Jersey Zinc from a fluid-bed process, using Sorel slag.

US Company to build Petrothene Polythene Plant

National Petrochemical Corporation are to build a new plant to produce 75 million lb. a year of USI petrothene polythene. At present, the corporation, which is owned by the National Distillers and Chemical Corporation and the Panhandle Eastern Pipe Line Co., has a plant at Tuscola, Illinois, with an annual capacity of 100 million lb.

The new plant, scheduled to begin production in 1958, will be operated by the US Industrial Chemicals Co. Division of National Distillers. Production will consist of intermediate density polythene resins made by the same modified high pressure process used in the Tuscola plant. The properties of the resins will lie between those of the original polythenes and the new high density resins produced by the 'low-pressure' processes.

In addition to the new polythene plant, National Petrochemicals are to build a plastics compounding plant near Tuscola with an output of 25 million lb. a year. At this plant, scheduled for completion by mid-1958, polythene will be compounded with colouring materials and/or other additives.

US Industry Seeks Better Protection From Foreign Chemical Industries

THE remarkable post-war revival in the chemical industries of West Europe and Japan is presenting increasing temptation for those countries to look on the huge US market as a convenient place to dispose of surplus production. This was stated by Mr. Richard F. Hansen, when he recently spoke on behalf of the Manufacturing Chemists' Association of the US and the Synthetic Organic Chemical Manufacturers' Association, in Washington DC recently.

Mr. Hansen was speaking before a meeting of the House Ways and Means Committee in support of two bills introduced to amend the Federal Anti-Dumping Act of 1921. The US chemical industry, he said, substantially supported those bills and on behalf of the two organisations he put forward a number of amendments designed to tighten anti-dumping legislation and give better protection to the industry in the US.

Apart from the great expansion of the chemical industries in West Europe and Japan, entirely new chemical industries had appeared in other parts of the world.

The US chemical industry groups urged the elimination of fair value as the yardstick of determining dumping, replacing it with foreign market value. Under the present Act both are used; fair value to determine dumping and foreign market value to determine the anti-dumping duty.

While commending a Treasury Department proposal to amend the statutory definition of foreign market value to bring it into closer accord with the definition of fair value in the Customs regulations, Mr. Hansen did not feel that this suggestion completely solved the problem.

The chemical industry groups also suggested that public notice of proposed dumping investigations be required and that the decisions of the Treasury Department and Tariff Commission be made public. Under the present law neither the Treasury nor the Tariff Commission are required to give notice or to publish either decisions or reasons for decisions.

Additional suggestions by Mr. Hansen included more complete definitions to prevent avoidance of the law by making minor changes in a product, a statutory definition of the word injury, and a clarification of the word industry to be any portion or subdivision of an organisation producing a particular product even though the organisation also produced other products not affected by the matter in question.

EVALUATION OF PTFE FILMS AS AIDS IN FOOD PROCESSING

BECAUSE of its non-sticking properties p.t.f.e. (polytetrafluorethylene or Fluon, ICI) is applied to metal surfaces, either in the form of a dispersion which is sprayed on and then cured, or used in the form of prefabricated sheets or cylinders. It has proved of use as a coating for bread and cake tins. Two investigators at the Research Station, British Baking Industries Research Association, J. B. M. Coppock and R. A. Knight, engaged on evaluating the extent of residues resulting from the projected use of new processing aids in the food industry, have examined the uptake of fluorine by bread and cake baked in pans treated with p.t.f.e. (*B.M.J.* 1957, ii, 355).

Bread was baked in p.t.f.e.-coated tins for two differing baking times (1) at 400°F. on five successive days and (2) at 550°F. on another five days. Fluorine was determined on the air-dried samples by the Society of Public Analysts' method ('Analyst', 1944, **69**, 243). In control loaves natural fluorine content of the crust was found to be 0.70 p.p.m. and of the crumb 0.75 p.p.m. Analysis of bulked samples from the p.t.f.e.-coated tins showed a fluorine content at the first bake at 400°F. of 1.80 p.p.m., falling to 1.50 p.p.m. at the fifth bake, rising to 2.55 p.p.m. when the baking temperature was raised to 550°F. and falling to 0.90 p.p.m. at the fifth bake at this higher temperature.

Reducing Fluorine Take-up

To determine whether an initial heat treatment or 'curing' would reduce fluorine take-up during the initial bakings, comparisons were made of the fluorine content of the air-dried crusts from loaves baked in tins (a) without curing (b) by sintering for 15 minutes and (c) by sintering for 60 minutes at 626–662°F. The following fluorine contents in p.p.m. were obtained after allowing for natural fluorine content of the bread:

Tin	A	B	C
1st baking	5.6	3.1	2.2
2nd ,,	3.8	3.2	1.5
3rd ,,	2.0	1.5	1.1
4th ,,	0.7	0.7	0.4

These results indicate that initial heating of the tins before use considerably reduces the fluorine uptake. The experiments were repeated using a longer sintering time of three to four hours at 680°F.

No. of bakings	Excess fluorine in whole loaf	Excess fluorine in crust
1	0.19	0.94
2	0.12	0.60
3	0.0	0.0

Curing under these conditions resulted therefore in a very small fluorine uptake. The overall increase in fluorine content was reduced to as little as 0–0.19 p.p.m. beyond the natural fluorine content in bread baked in non-p.t.f.e.-treated tins which in this latter series of experiments was 0.90 p.p.m.

Cake mixtures (madeira, sponge, high ratio cakes) baked in p.t.f.e. coatings sintered under the last-mentioned conditions gave for madeira mixture a fluorine content at the first bake of 1.23 p.p.m., and the same figure at the eleventh bake. The natural fluorine content on air-dried samples was 1.25 p.p.m. Corresponding data for sponge cakes were 0.92 p.p.m., 0.92 p.p.m., and 0.92 p.p.m. at the tenth bake, and in the case of high ratio cake 0.78 p.p.m., 0.81 p.p.m. and 0.84 p.p.m. at the tenth bake.

Coppock and Knight conclude that uptake is negligible when adequate 'curing' has been given. The fluorine contents of bread or cakes in the experiments in which suitably 'cured' p.t.f.e. coatings were used were, in fact, considerably less than the proposed fluorine limit for self-raising flour of 3 p.p.m. (*Minist. Food Bull.*, 1953, 6 June, 13).

The results obtained indicate that fluorine uptake from p.t.f.e.-coated tins or baking sheets is considerably reduced by 'curing' at 680°F. for three to four hours. Under these circumstances there is little or no increase in the total fluorine content of the products baked thereon. The baking industry has therefore been advised of the desirability of the 'curing' process.

Selenium, Silicon and Germanium Markets in the US

SELENIUM, in difficult supply for many years, is now stated to be building up to a considerable oversupply in the US. Producers' stocks as indicated in the latest (April) UK Bureau of Mines monthly information sheet were 393,240 lb., compared with 68,722 lb. in the same period of 1956.

Last summer selenium shipments (including metal, alloys and compounds) in the US averaged 90,000 lb. per month; in November 1956, shipments dropped to 68,000 lb., and in December, to 45,000 lb. Monthly shipments for the first four months of 1957 averaged about 43,000 lb. Production of selenium has, however, remained close to the average 93,000 lb. per month in 1956, i.e. at about 90,000 lb. per month.

Imports of selenium by the US are lower this year; the monthly average in 1956 was 19,301 lb. compared with an average of 10,000 lb. per month during the first three months of this year.

Two factors are suggested by US industry experts for the present selenium position. Firstly, consumers are thought to be using their reserve stocks until selenium prices, which are falling, find their level (see CHEMICAL AGE, 9 February, p. 240). Secondly, germanium and silicon have already encroached on selenium markets in the semiconductors field. If there is a marked change to these other semiconductors, present selenium consumers do not want to be left with excess stocks of selenium.

Some producers of selenium in the US are said to consider the present reduction in selenium consumption as only temporary and believe that demand will gradually rise to the 1956 level. Others, however, do not hold this view. At least one US electronic equipment manufacturer has changed over from selenium to germanium rectifiers and a manufacturer of germanium rectifiers has announced price reductions up to 10 per cent, made possible by greatly increased production.

Manufacture of high purity silicon for electronic uses has started in the US. Texas Instruments announced commercial availability of silicon this spring and claim to deliver 'any size production order'. This company states that it already controls 90 per cent of the US silicon transistor market. Eagle Picher also began production of silicon early this year, and Tungsten Chemical Division of Sylvania Electrical Products, Towander, Pennsylvania, makes it for sale and captive use. Du Pont is constructing at Brevard, N.C., what is described as the 'world's first full-scale manufacturing establishment' for high-purity silicon. Scheduled for completion in 1958 the plant is to produce 70,000 lb. per year (50,000 lb. of semiconductor grade and 20,000 lb. of solar-cell-grade silicon).

Several other producers have started, or are about to start, commercial production of high-grade silicon for electronic uses. Thus, Grace Chemical have formed with Pechiney of France a new company to produce silicon. The Grace-Pechiney plant is to have a capacity of 20,000 lb.

Research and development programmes in various research groups have been stepped-up, such as General Electric's high purity silicon research, projects at Battelle Research Institute and Armour Research Institute.

Other companies also interested in research on silicon are stated to be Merck, Mallinckrodt, Westinghouse, Monsanto Chemicals, Foote Mineral and Kawecki.

Estimated use of silicon in the US this year for electronic products is 20,000 lb. A demand of 100,000 lb. per year is expected five years' hence. Military needs are the important factor behind the growth of silicon, according to US reports and indeed the US Government has been financing silicon semiconductor development.

Use of germanium for semiconductors is expected to increase also, some 5 million transistors being required by the US military (compared with 2 million silicon transistors). Demand in 1959 is put at 27 million units (with 18 million silicon units). Commercial and industrial uses of silicon transistors is estimated at 250,000 units and 8 million germanium units; by 1959, the demand is expected to be over one million silicon and 50 million germanium units. For radio, television, tape recorders, etc., germanium transistor use is expected to reach 11 million units this year and over 20½ million in 1959. These estimates are based on present-day markets for transistors.

Commercial News

Higher Tax Rate Restricts Distillers Profit Rise

THIS year, The Distillers Co. Ltd. have had to meet taxation charges of £12,058,558 (£10,484,301). Sir Henry J. Ross, chairman, in his annual statement describes this as 'a somewhat disheartening feature of a successful year's trading, for although our profit increased by £2,100,000, we were only £600,000 better off, with a net profit of £9,817,587, against £9,209,869 last year'.

A final dividend of 1s 3d is proposed on ordinary, making 18¾ per cent (17½ per cent). Carry forward totals £2,274,454 (£2,354,431). In future, results will be published half-yearly.

The industrial group has followed a policy of price restraint and, despite higher raw material costs, increased efficiency and turnover had enabled the group to show further improvement in earnings.

Although there was a sharp fall in sales of general chemicals to some major industries, overall home sales of synthetic organic chemicals and solvents showed a small expansion and exports also increased. Sales of carbon dioxide are expanding rapidly owing to its extended use in industrial fields.

British Hydrocarbon Chemicals now have in operation a plant for the manufacture of propylene tetramer. Grange Chemicals are said to have had a successful first year and to be producing a high grade of detergent alkylate at well above designed output.

Another subsidiary, Forth Chemicals, have completed a major extension for the production of monomeric styrene and the company can now supply the present entire domestic usage of this product. A 12,000 ton polythene plant is now under construction for British Hydrocarbon Chemicals.

In the biochemical division, licences for the production of Distaquaine V penicillin have been granted to three other leading British pharmaceutical houses 'on suitable terms'.

In the plastics division, British Geon, by arrangement with B. F. Goodrich Chemical Co., US, are constructing a new plant at Barry, South Wales, for the production of oil-resistant synthetic rubbers and latices, which will be marketed under the trade name 'Hycar'.

Reporting on Murgatroyd's Salt and Chemical, Sir Henry said that salt was a difficult market, with sales lower owing to intense continental competition. The company is meeting the total needs of British Geon for chlorine for the manufacture of p.v.c.

Expansion programme of the National Chemical Products Ltd. of South Africa has made a valuable contribution to the year's trading, which reflects higher turnover and earnings. An improvement in the trading results of CSR Chemicals Pty Ltd., Australia, was due to the bounty granted by the Australian Government on the production of cellulose acetate flake. Expansion of this company's general chemical and plastics division has made notable progress.

Beecham Group

A first interim dividend of 10 per cent has been declared for the year ending 31 March last. This is the same rate as the first interim on account of 1956–57. Total payment for the latter period was 32½ per cent.

Borax Holdings Ltd.

At a meeting of the board of Borax (Holdings) Ltd., held on 15 August, the directors declared an interim dividend in respect of the year to 30 September 1957 of 1.75d per 5s unit of deferred ordinary stock subject to deduction of income tax. The dividend will be payable on Friday, 27 September 1957.

Catalin Ltd.

Plastics manufacturers, Catalin Ltd., record a group net profit, before tax, for the 12 weeks ended 15 June 1957 of £6,756. When added to the £9,659 for the first quarter, the total profit is £16,415 (£11,053). Results, however, for the second quarter are expected to be somewhat reduced. The outlook for the third quarter is suggested as being reasonable. Chairman, Mr. J. E. Currie, considers that the present level of profits will be maintained.

Gas Purification

Gas Purification and Chemical Ltd. have acquired, against the issue of 82,500 shares of 5s, the entire share capital of Hafron Securities, a private investment company, with net assets of £79,898. It is stated that this acquisition will further strengthen the liquid resources of the Gas Purification group.

Harbens Ltd.

An unsatisfactory year's trading was reported at the annual general meeting of Harbens Ltd., producers of viscose rayon. In his report, Mr. J. Harold Mandleberg, chairman, said that although there had been a 10 per cent increase in selling price towards the end of the financial year, rising costs had absorbed this increase. Competition, both domestic and foreign, had become even more intense.

Mr. Mandleberg stated that he attached the greatest importance to the company's 10-year technical interchange agreement with the American Viscose Corporation, the largest producer of rayon yarn in the US. The agreement provided for technical interchange and an exclusive right to use, in the UK, all such patents of American Viscose as refer to the production of viscose rayon yarns of all types. The company also had access to the research establishments of American Viscose. Visits had already been interchanged between the companies.

The help already given to Harbens in so short a time is described as 'considerable'. Experiments were now proceeding with a view to improvement in the physical properties of Harbens industrial yarn. It was felt that these will result in production of a product 'second to none'. In addition, a yarn with entirely new properties would shortly be produced. It would be for branches of the textile trade not catered for previously.

Hope was expressed that there would be the minimum of government interference. If left free to work out its policies, and the new contact leads to the improvements anticipated, the future should not be regarded with pessimism.

Trading profit was £143,003, £102,146 less than in the preceding year. Net loss was £84,534 compared with a corresponding loss last year of £4,658.

Hicking Pentecost

Although Hicking Pentecost and Co., bleachers and dyers, etc., had some increase in turnover in the year ended 31 March last, costs have continued to rise. This was stated by Mr. L. S. Pentecost, chairman, in his annual report. Prices had been increased but had not kept up with increased costs.

Some general improvement in trade occurred in the latter half of the financial year and has continued following the operation of additional plant. Each of the works has run at full or near capacity in most departments. Development of the company's Northern Ireland subsidiary had not developed as anticipated and a small loss was incurred. There had been some increased activity since the end of the year and it is therefore hoped the results will be better.

Group net profits for the year were lower at £92,095 (£101,011). The 15 per cent dividend is being repeated.

Hilger and Watts

The previous 3 per cent interim dividend rate on the increased ordinary capital for the year ended 30 September 1957 is being maintained by Hilger and Watts Ltd., scientific instrument makers. A final of 7 per cent was paid on the larger capital for 1955–56.

According to the board, trading results for the current year to date are satisfactory, and the order book remains at a high level.

James Laing Son and Co.

Manufacturers of dextrines, foods, chemicals, oils, etc., James Laing, Son and Co. (Manchester), report group trading profit for the year ended 31 March 1957 is £89,890 (£94,148) net profit is £44,412 (£45,197) and dividend ,as stated on 31 July, is 6¼d per 4s unit (same). Net current assets are £325,960 (£329,115) and net assets £501,967 (£473,878). It is announced that the Goole factory building programme has been completed.

Aluminium Ltd.

Special factors have once again affected Aluminium Ltd. This year there is the

strike at the Arvida Smelter, which began in mid-May and which is still continuing.

Consolidated sales and operating revenues for the half-year to 30 June 1957 amount to $233.54 million, compared with $225.39 million in the corresponding 1956 period. Net income is $26.55 million, compared with $24.80 million.

Primary aluminium production at the Canadian plants, states Mr. Nathanael V. Davis, president of the company, was 304,515 tons, compared with 249,915 tons a year ago, when operations were severely restricted by an abnormal water shortage. Of the present strike, Mr. Davis says that while the strike added to the cost of sales during the second quarter, it had little impact on sales, as, prior to its commencement, production had been running in excess, resulting in a substantial inventory of aluminium. The full cost of the strike has therefore not been absorbed in the first six months' results.

Dealing with the expansion programme, Mr. Davis reports that power facilities in British Columbia and Quebec adequate to support aluminium ingot production of approximately 1 million tons per annum and the necessary raw material facilities are expected to be completed by 1959–60. Smelter facilities to bring the company's total Canadian ingot capacity to 880,000 tons per annum have been authorised and should be completed by the end of 1958.

Courtaulds (Australia)

Following an increase in the profit of Courtaulds (Australia) of £A37,484 to £A465,000, the company is to pay a dividend of 4½ per cent on the ordinary shares with a 2½ per cent final for the year to 30 June last. For 1955–56, the dividend was 2 per cent.

The 1956–57 profit is the third earned since the company was formed in 1949.

Olin Mathieson

Net sales of Olin Mathieson Chemical Corporation in the three months ended 30 June 1957 totalled $153,386,736 ($155,709,731). This was a decline of 1.5 per cent. Second quarter sales were 13 per cent higher than those of the first quarter of this year. In the quarterly report to stockholders, Thomas S. Nichols, chairman, and Stanley de J. Osborne, president, stated that the slight dip in sales was a reflection of general business conditions in a number of the company's key industries.

Dupont Co. Canada

Increased costs, including those inevitably incurred during the pre-manufacturing and initial operation periods of large production units, partly offset the effect of increased sales, the Dupont Company of Canada (1956) Ltd. report for the first half of 1957. Earnings of the company were $2,639,000 or 35 cents a share of common stock, an increase of about 8 per cent over earnings of $2,453,000 or 33 cents per share in the same period last year. Sales for the period were $35,742,000 compared with $32,497,000 in the first half of 1956, an increase of 10 per cent.

The growth in sales reflected increased acceptance of nylon yarn for automobile tyres, heavier demand for Cellophane cellulose film and gains in such newer products as Freon fluorinated hydrocarbons and paints, the company reported.

Depreciation provision was lower $1,934,000 as compared with $2,384,000, reflecting the modified decreasing balance method adopted in July, 1956. However, there was a corresponding increase in provision for future income taxes.

A commercial explosives plant near North Bay, Ontario, went into production in June and a plant to make Orlon acrylic fibre at Maitland, Ontario, is scheduled to start up this summer.

Vanadium Corp., US

June half-year sales of the Vanadium Corporation of America are reduced to $29,207,486 from $33,178,852 in 1956. Net earnings are $2,480,762 compared with $3,258,265 for the same period of the previous year. It is reported that profits have been affected not only by reduction in sales volume but by power and labour costs not offset by price increases.

INCREASES OF CAPITAL

CARBOLINEUM PRODUCTS LTD., wood preservative manufacturers, etc., Campbell Street, Belper. Increased by £9,000 beyond registered capital of £1,000.

PLASTICS FILTERS LTD., chemical engineers etc., 39 High Street, Crawley, Sussex. Increased by £4,000 beyond registered capital of £1,000.

GEMEC LTD., 103 Mount Street, London W1. Increased by £500,000 beyond registered capital of £2,000,000.

SHAWINIGAN LTD., manufacturers of mineral, metallic and electro-chemical substances etc., Marlow House, Lloyd's Avenue, London EC3. Increased by £15,000 beyond registered capital of £10,000.

NEW COMPANIES

HOUSEHOLD LABORATORIES LTD. Cap. £1,000. Objects: To acquire the business of a chemical manufacturer carried on by Edward Spiero at Prested Road, London SW11, and to carry on the business of chemists and manufacturers of and dealers in chemical bleaching powders, and liquids, etc.

JOHN HEWITT (BIRKENHEAD) LTD. Capital £1,000. To carry on the business of pharmaceutical, manufacturing, dispensing and analytical chemists, etc. Directors: Mrs. J. Hewitt, F. J. Tresidder and E. Clarke. Reg. office: 113 Grange Road, Birkenhead.

SCIENTIFIC AND CHEMICAL SUPPLIES LTD. Cap. £3,000. As manufacturers of and dealers in scientific, engineering, optical, photographic, medical and surgical instruments and apparatus, chemicals, etc. Directors: John R. Turton and Mrs. Kathleen V. Turton. Reg. office: 2 Windmill Bank, Wombourn, near Wolverhampton.

MORTGAGES AND CHARGES

ALLEN AND HANBURYS LTD., chemists, 16 July, substituted security supplemental to a trust deed dated 27 March 1951; charged on strip of land abutting on east side of company's property at Coventry Road, Bethnal Green, London E.

LEDA CHEMICALS LTD., London W. Satisfaction 22 July of mortgage registered 19 November 1953.

SATISFACTIONS

BRITISH CELANESE LTD., London W. Satisfaction 17 June of debenture stock registered 2 October 1943, 8 November 1944 and 24 September 1946.

LANCASHIRE TAR DISTILLERS LTD., Manchester. Satisfaction 19 July of trust deed registered 24 January 1951, to the extent of £12,043.

L. LIGHT AND CO. LTD., London SW. Satisfaction of debenture registered 6 March 1936 and series of debentures registered 15 November 1939.

LONDON GAZETTE

Voluntary Winding-up

(A resolution for the voluntary winding-up of a company does not necessarily imply liabilities. Frequently it is for purposes of internal reconstruction and notice is purely formal).

ELLIOTT AUTOMATION LTD., manufacturers of articles for the indication, control and operation of manufacturing processes, registered office, Century Works, Lewisham, London SE13. By special resolution, 9 August. E. O. Herzfeld, Southview, Meadow Way, Farnborough Park, Kent, appointed liquidator.

Office Work Streamlined

Joseph Crosfield and Sons Ltd., Warrington, report that they are carrying out investigations into the nature and extent of clerical work in their offices. These have indicated that streamlining methods would result in some staff becoming surplus. It was anticipated that the problem could be met by dispensing with the services of some of the temporary and probationary staff, but no immediate change was imminent. The investigations have been based on work study techniques.

Prices of Acetone and Other Solvents

IT HAS been pointed out that the prices quoted for acetone, secondary butyl alcohol, methyl ethyl ketone and isobutyl ketone in our issue of 27 July (p. 151) are below the generally accepted levels. The prices should be:

	Acetone	*Sec. butyl alcohol*	*Methyl ethyl ketone*	*Methyl isobutyl ketone*
Bulk deliveries in tank wagons	£	£	£	£
Min. 400 gall.	85	125	140	166
Min. 1,400 gall.	84	124	139	165
Min. 2,400 gall.	83	123	138	164
Packages (in 40/45-gall. drums)				
Less than 1 ton	93	133	148	174
1 to 5 tons	90	130	145	171
5 to 10 tons	89	129	144	170
10 tons and over	88	128	143	169
(in small containers)				
5-gall. drums	128	168	183	209
10-gall. drums	118	158	173	199

Company Meeting

THE DISTILLERS COMPANY LIMITED

THE 80th Annual General Meeting of the Distillers Company Limited will be held in the North British Hotel, Edinburgh, on Friday the 13th day of September, 1957, at 12.30 p.m. The following are excerpts from the statement by the Chairman, Sir Henry J. Ross, which has been circulated with the Report and Accounts for the year ended 31st March, 1957:—

You will note that the trading profit for the year, after charging depreciation, amounted to £21,432,602, compared with £19,584,795 last year. Our income from trade investments was also higher, at £1,259,306 against £1,018,441, mainly through receiving a first dividend on our investment in Murgatroyd's Salt & Chemical Company Limited. After charging interest on loans, the profit before taxation was £22,452,798, an increase of £2,141,368.

This year, we have had to bear the full weight of the tremendous burden of taxation imposed upon British Industry by the Finance Act of 1956, and the provision required amounts to £12,058,558, compared with £10,484,301 last year. This is a somewhat disheartening feature of a successful year's trading, for although our profit increased by £2,100,000, we are only £600,000 better off, with a net profit of £9,817,587 against £9,209,869 last year.

Your Directors have decided to write down certain investments in Subsidiary Companies and, after various other "below the line" adjustments, none of which calls for special comment, the amount available for appropriation is £9,424,572. Of this figure, our Subsidiaries have retained £3,239,098, and the amount available to the Distillers Company itself is £6,185,474. In view of the very favourable results achieved, and despite the fact that the greater part of the higher profit has been absorbed by taxation, your Directors feel that a moderate increase in dividend is justified. They therefore recommend that the final dividend on the Ordinary Capital should be at the rate of 10½d. per share of 6s. 8d., which, with the interim already paid of 4½d. per share, makes 1s. 3d. per share for the year, or 18¾ per cent, as compared with 17½ per cent last year.

Out of the remaining balance, your Directors have transferred £1,500,000 to General Reserve, leaving a balance of £89,977 to be added to the amount of unappropriated profits brought forward, and making the amount to be carried forward £2,364,431.

As regards the Consolidated Balance Sheet, you will observe that we have expended some £3,300,000 upon additions to land, buildings, plant, etc. This covers a very wide field, but the main expenditure has been upon the construction of additional warehouse accommodation at our Scotch Whisky Distilleries, and on the erection of new premises and plant by one of our principal Gin Companies, to which I referred last year. We also exercised our option to purchase the Yeast Factory at Dovercourt, Harwich, which for some years we had managed for The Standard Yeast Company Limited.

Stocks have again risen by some £2,400,000, partly due to augmenting our stocks of Scotch Whisky, although increases in the inventories of other sections of our business have also occurred. There was a slight improvement in the liquid position of the Group as at 31st March last, the excess of current assets over current liabilities being £83,271,522 compared with £80,418,637 last year.

On the Liabilities side, you will notice a small increase in issued Ordinary Capital. This was due to the conversion of a further £131,525 of 5 per cent Unsecured Loan Stock 1964, and, in this connection, I should mention that the current financial year provides the last opportunity of converting this stock into Ordinary Shares. The option expires on 30th November, 1957. Most of the holders of the original £10,000,000 loan have already exercised their right to convert, but there remains a balance of £370,050.

A substantial proportion of the item "Interest of Outside Shareholders in Subsidiary Companies" consists of Preference Issues made by some of our Companies and held by the general public. Recently your Board decided that it would be much simpler administratively for these issues to be held by the Distillers Company itself, and made an offer to the holders to exchange them for a 5¼ per cent Consolidated Unsecured Loan Stock of the Distillers Company. As announced in the Press, the offer was accepted by the requisite majorities in each case. The effective date of transfer was 1st April, 1957, so that the transaction does not affect the Accounts under review, but the greater part of this item will be eliminated from the Accounts next year.

The only other comment which I think need be made on the Balance Sheet position is that the Ordinary Shareholders' funds have increased during the year by £5,083,441, as a result of the ploughing back of profits earned, and they now total £90,231,901.

INDUSTRIAL GROUP

The products manufactured by the Divisions and Companies comprising the Industrial Group show for the most part an increase in the volume of sales, and the past year has been one of general progress. Although we have adhered to a policy of price restraint and have had to meet higher raw material costs, increased efficiencies and turnover have enabled the Group to show further improvement in earnings.

The chemical and plastics industries continue to expand vigorously, particularly in materials derived from petroleum, and the past year has seen the completion of extensions and the launching of new projects which should add significantly to your Company's position in these fields and its future earning power.

GENERAL CHEMICAL DIVISION. Despite a sharp fall in sales to some of the major consuming industries, notably the motor car industry, our overall home sales of synthetic organic chemicals and solvents showed a small expansion during the year and exports also increased.

As already indicated, raw material, fuel and also labour costs continued their upward trend. A major problem was the sudden substantial increase in the price of molasses, from which an important part of our industrial alcohol requirements is produced. Fortunately, the timely completion of British Hydrocarbon Chemical's extensions at Grangemouth for the production of synthetic industrial alcohol from petroleum enabled the Company to cushion the full impact of the higher molasses price on our consumers of industrial alcohol.

At Hull, the vinyl acetate plant of our associated Company, Hedon Chemicals Limited, was commissioned on time. Market conditions are competitive, but sales are developing satisfactorily.

Despite the poor summer last year, and the consequent contraction of the traditional outlets in the beverage and ice cream trades, total sales of carbon dioxide continued to expand rapidly, owing to the extended use of this material in industrial fields. In view of the large programme contemplated for the construction of nuclear power stations, it is of interest to record that the carbon dioxide equipment required at Calder Hall was designed and installed by your Company, which is one of the main suppliers of this product.

BRITISH HYDROCARBON CHEMICALS LIMITED, GRANGEMOUTH. As already stated, the major ethylene and alcohol plants of British Hydrocarbon Chemicals Limited were successfully commissioned, and doubled the then existing capacities.

The new butadiene plant is also in full operation. The entire output is being sold for the production of synthetic rubbers and similar polymers. In addition, the plant for the manufacture of propylene tetramer, the main raw material for detergent alkylates, has been completed and is now in operation.

Grange Chemicals Limited, a subsidiary manufacturing detergent alkylate required in the production of synthetic soaps, has had a successful first year, and is now producing a very high grade product at well above designed output.

Forth Chemicals Limited, also a subsidiary, has completed its major extension for the manufacture of monomeric styrene, and is operating successfully. This Company is now able to supply the present entire domestic usage of monomeric styrene and sales are at a high level.

Your Company has sub-licensed to

Company Meeting (cont'd)

British Hydrocarbon Chemicals the exclusive rights which we hold from the Phillips Petroleum Company of USA for the production of low pressure high density polyethylene by an improved process, and a plant with an annual capacity of 12,000 tons is now under construction. The fields of application for polyethylene are constantly expanding, and the special material to be produced should be readily absorbed in this growing market.

BIOCHEMICAL DIVISION. The year under review has shown even keener competition in what may be termed the basic antibiotics—namely Penicillin and Streptomycin. The trend towards better prices to which I referred last year has not progressed as far as expected, and the competitive conditions in many markets leave very little margin. Continuous research leading to improvement in yields has helped us to maintain our position, and the extensions of our range of products has enabled this Division to show reasonably satisfactory profits. I referred last year to the successful introduction of a new form of Penicillin—Distaquaine V—which for the first time made Penicillin available in a safe, effective form for administration by mouth. This product is now well established and is in great demand. Licences under our exclusive manufacturing rights have been granted to three other leading British pharmaceutical houses on suitable terms.

PLASTICS DIVISION. Our sales during part of the year inevitably reflected the credit squeeze and the recession in the motor industry. The demand in the latter part of the year, however, showed encouraging growth, which still continues although there is keen competition in certain materials. We are securing increasing sales of "Geon" polyvinyl chloride, "Styron" polystyrene and the "Epok/Cellomold" range of synthetic resins and moulding powders. The raw materials for these products are mainly supplied by associated companies within the Distillers Group.

By arrangement with B. F. Goodrich Chemical Company, USA, British Geon is now constructing a new plant at Barry, South Wales, for the manufacture of oil-resistant synthetic rubbers and latices, which will be marketed under the registered trade mark "Hycar." These materials are at present imported from the USA, and the growing demand for them in this market gives every assurance of our being able to dispose of the output of the new plant.

MAGNESIUM. Our associated company, Magnesium Elektron Limited, had a very good year in sales of magnesium and its alloys. Our subsidiary, F. A. Hughes & Company Limited, which has developed jointly with Magnesium Elektron Limited the new cathodic protection of metals against corrosion by the use of magnesium anodes, has had an outstandingly successful year in the installation of its "Guardion" system in ships, particularly tankers. The efficacy of this anti-corrosion method is receiving widespread recognition, and this is reflected in the record sales achieved.

TRADE NOTES

The British Tyre and Rubber Co. Ltd. is changing its name to BTR Industries Ltd. from 16 September. This change, which is subject to confirmation by stockholders, is, in the words of the company, designed 'to emphasise its relationship to industry in general as British thermoplastic and rubber manufacturers'.

Heat-Resistant Resin

Hetron 33, said to be a semi-rigid, self-extinguishing, heat-resistant resin, has been produced by the Durex Plastics Division of the Hooker Electro-Chemical Co. Recommended uses include those where high impact and structural strengths are required. Sole representatives for Durex in the UK are Omni (London) Ltd., 35 Dover Street, London W1.

Moisture Resistant Primer

A special primer for application to moist concrete, asbestos cement, plaster, brickwork and similar surfaces. Known as Pitan MC Primer, it may be applied over existing paint which has become moist due to contact with water.

Foxboro-Yoxall's New Factory

Foxboro-Yoxall's new factory at Redhill, Surrey, is now nearing completion. On a 58 acre site, the factory is designed to accommodate the latest techniques in instrument manufacture. The move from the three existing factories at Kidbrooke, Wandsworth and Merton is proceeding smoothly.

Vinyl Inks

A series of vinyl inks produced by Johann Karl Kochen of Krefield, Germany, sold under the trade name Herkula are now being manufactured under licence in this country by Dane and Co. Ltd., 1–2 Sugar House Lane, Stratford, London E15. The series includes intaglio inks, tipping finishes for p.v.c., etc., p.v.c. inks for leatherette, embossing inks for fabric and wipe shading inks.

Laporte Price Changes

Prices of two chemicals produced by Laporte Chemicals Ltd. have changed.

Sodium percarbonate, minimum 12½ per cent, available oxygen is now 170/9d. per cwt. in 1-cwt. kegs. Sodium sulphate, solid 60/62 per cent, spot delivered in drums, is now £36 2s 6d per ton and broken, delivered in drums, £37 2s 6d per ton.

New Telephone Number

New telephone number of Moritz Chemical Eng. Co. Ltd., 204 Earls Court Road, London SW5, is FRObisher 3174/5.

Benson-Lehner (GB) Ltd.

The Benson-Lehner Corporation of Los Angeles announces that its new British subsidiary, Benson-Lehner (GB) Ltd., has taken over many of the functions of Benson-Lehner's own British division, at 12 Bargate, Southampton. The new company will continue the supply and maintenance of a wide range of scientific data processing equipment, including analysers for strip chart records and cine film, automatic graph plotters, etc.

Increased Import Duty Refused

The Board of Trade announced on 30 March 1955 that they had received an application for an increased protective import duty on synthetic potassium nitrate.

The Board now announce that Her Majesty's Government has concluded that a case has not been made out for increased protection for this material.

Chemstrand's N. Ireland Plant

Production at the Chemstrand Acrilan fibre plant at Coleraine, Northern Ireland, is scheduled to start in mid-1958. The programme at Coleraine, according to Chemstrand Corporation's 1956 report is 'moving along well'. The entire project should be completed by mid-1959.

Market Reports

STRONG UNDERTONE REPORTED

LONDON There has been some expansion in the volume of enquiry on home account and a steady flow of orders for shipment has been reported. The soda products and the potash compounds are on a firm price basis and in most other sections of the industrial chemicals market the undertone is strong.

In the coal-tar products market there has again been a steady demand for creosote oil and the cresylic acids but there has been little interest in pitch on export account.

MANCHESTER Trading on the Manchester market for heavy chemicals during the past week has been somewhat livelier and it is expected that the next few weeks will see conditions back to normal after the holiday interruption. Textile and other industrial chemicals are being called for in reasonably good quantities and a fair flow of new enquiries is circulating. Shipping business continues on steady lines. The undertone of the market generally is firm. Fair buying interest is being shown in basic slag and one or two other sections of the fertiliser trade, while a steady demand for most of the light and heavy tar products is reported.

GLASGOW Although some areas are still being affected by the holiday period, the level of business during the past week in the Scottish heavy chemical market has been fairly steady. Demands have been for the usual range of chemicals both for prompt and forward delivery.

As can be expected at this time of the year a much quieter position prevails in agricultural chemicals, while the export market continues active, with numerous enquiries being received.

Prices generally have remained unchanged.

PEOPLE in the news

● DR. R. WHITEHEAD, former chief chemist in the sewage department of Huddersfield Corporation, has been appointed senior chemist at Middlesex County Council's Deepham works.

●MR. G. K. NOTMAN, a laboratory assistant with the metallurgical section of the engineering research department at ICI Billingham division, before going to the Royal School of Mines, has graduated with a B.Sc.(Lond.) with first class honours in metallurgy. He has been awarded the Bessemer medal and a half-share in the Charles Slater prize for 'excellence in metallurgy'. Mr. Notman has also been offered a research grant by the Department of Scientific and Industrial Research.

●DR. BENJAMIN E. SHACKELFORD who has been appointed a vice-president of Ad. Auriema Inc., exporters, 89 Broad Street, New York 4, will work as a consultant on export sales, including foreign licensing and patents.

●DR. W. A. JOHNSON, has resigned as chemical production manager of the British Drug Houses Ltd., to take up an appointment as general manager of Pure Chemicals Ltd., Kirby Industrial Estate, nr. Liverpool. MR. R. O. ATKINSON has succeeded Dr. Johnson as chemical production manager.

●DR. R. OWENS has been appointed Director of Explosives and Chemical Production at the Ministry of Supply.

●DR. R. BELCHER, reader in analytical chemistry at Birmingham University was elected president of the analytical section of the International Union of Pure and Applied Chemistry at the 10th International Congress held recently in Paris. Dr. Belcher has succeeded PROFESSOR I. M. KOLTHOFF in this office.

●MR. ERIC HEWITT-SYMONDS, research chemist at Lever Bros., Port Sunlight, recently married Miss Grace E. Ross, catering supervisor at the works.

●Three members of the managerial staff of ICI Billingham division have promised to give lectures on problems of management at the refresher course for works managers and plant engineers at Leeds University 16 to 20 September. They are DR. H. E. NORTH, DR. J. A. COOPER and MR. E. J. CHALLIS. The course has been arranged by the National Industrial Fuel Efficiency Service.

●Promoted to the post of general manager of Dunlop's compositions' division, MR. N. G. BASSETT SMITH, aged 47, will have charge of their new £350,000 factory, situated between Fort Dunlop and Castle Bromwich (see CHEMICAL AGE, 17 August, p. 248). Joining Dunlop in 1926, Mr. Bassett Smith's first post was to manage the rubber wing division at Fort Dunlop. On returning from the Army, with the rank of Lt.-Col., he was made sales manager of Dunlop special products and became manager, on its formation, of the compositions' division, a post which he held until his present promotion.

●MR. G. S. KUSCHKE, manager, Industrial Development Corporation of South Africa has been appointed a member of the Standards Council of South Africa. Mr. Kuschke, is an executive of the S.A. Federated Chamber of Industries, a director of Masonite Ltd., Good Hope Textile Corp., Fine Wool Products of South Africa Ltd., and the South African Cellulose Corporation.

●When MR. TOM BRODIE retired recently from the research department of the ICI Nobel division after 45 years' service with the company, he received a formal presentation from Dr. David Traill, research director. He was associated with the development of the smokeless fuse, Cordtex plastic-covered detonator wire and plastic igniter cord.

●MR. L. C. HARMAN has been appointed to the board of Waymouth Gauges and Instruments Ltd., one of the Smiths group of aviation companies. In 1948 Mr. Harman was appointed as divisional chief accountant of Smiths Aircraft Instruments Ltd. and Smiths Industrial Instruments Ltd. In 1957 he joined the board of Waymouth Gauges and Instrument Ltd.

● LORD GEDDES has resigned as chairman of the Admiralty Fuels and Lubricants Advisory Committee but will continue as a member. He has been succeeded as chairman by Dr. C. M. Cawley, of the Department of Scientific and Industrial Research.

● Chemstrand Ltd. have appointed MR. T. H. MAKEPEACE as works manager of their new Northern Ireland plant. After the war, Mr. Makepeace joined Tootal Broadhurst Lee and Co. Ltd., as manager of the bleaching department. He was later manager of the finishing and dyeing departments and then manager of fabric and process development. He also travelled for this firm, as technical consultant, to France, Holland, Italy, in fact, most of Europe and the US. In 1954 he joined the US company of W. R. Grace and Co. as manager of the central finishing plant of the textile organisation at Lima, Peru. Mr. Makepeace returned to England to join Chemstrand early this year and then went to the US for three months to study organisation and methods at the parent company in Decatur, Alabama. He will be going over to Coleraine early next month.

● MR. TERENCE D. O'KEEFE, who has been associated with the industrial consulting practice, George Lewi and Partners, has joined MR. DAVID LEE in partnership. The name of the practice remains unaltered.

●MR. CHARLES H. ATWOOD has been appointed president of Union Carbide Caribe, Inc., a subsidiary in Puerto Rico, of Union Carbide Corporation. Union Carbide Caribe are to operate the new petrochemicals plant under construction near Ponce, Puerto Rico, which will produce ethylene oxide and derivatives.

●SIR EWART SMITH a deputy chairman of ICI Ltd., has retired from membership of the British Productivity Council. SIR MILES THOMAS, chairman of Monsanto Chemicals Ltd., has been nominated as one of the Federation of British Industries representatives on the Council in his place.

●MR. HAROLD ELLIOTT, industrial representative of the Mobil Oil Co. Ltd. in Northamptonshire since 1925 retired on 13 August. He is succeeded by MR. C. T. WHEATCROFT, a sales engineer in the company's Midlands industrial division.

●MR. H. E. SNOW and the HON. M. R. BRIDGEMAN have been appointed deputy chairmen of the British Petroleum Co. Ltd.

●MR. A. F. PEART has been appointed manager of the London office of V. L. Farthing and Co. Ltd. at 28 Victoria Street, London SW1. He will undertake technical sales for Ashworth and Parker Ltd., of Rotoklene strainers, Maxim Silencers Ltd. (evaporators) and Vernon Engineering Co. Ltd. (water seal compressors and vacuum pumps, float regulating valves, and mechanically and pneumatically operated regulating valves).

●SIR HUGH LINSTEAD, joint secretary of the Pharmaceutical Society, has been presented with the certificate of honorary membership of the Saskatchewan Pharmaceutical Association by Mr. W. S. Hunter, a Saskatchewan pharmacist who has been in this country as a member of the Canadian contingent to the Boy Scouts' Jamboree.

Obituary

MR. ARTHUR WORTHINGTON, who died at Bolton on 13 August, aged 78, took a leading part in the development of the Great Lever Chemical Works of John Smith Jun. and Co. He was a member of the third generation of the family to be associated with the business and was managing director at the time it passed into control of Bleachers' Association. That was in 1945.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s. 3d. including postage; annual subscription £8.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period

ACCEPTANCES

Open to public inspection on 2 October

Nickel-chromium-cobalt alloys. Jessop & Sons, Ltd., W. **783 955**

Synthesis of guanidine derivatives from SO_2, CO_2 and NH_3. Minister of National Defence of Canada. **783 950**

Manufacture of epoxy resin products. Aero Research, Ltd., and Mackenzie, J. B. D. **783 956**

Heat treatment and surface treatment of metals, Office National d'Etude et de Recherches Aeronautiques, O.N.E.R.A. **783 951**

Process for the manufacture of amino-acyl compounds. Ciba Ltd. **783 959**

Production of aliphatic amino-sulphonic acids. Ruhrchemie AG. **784 070**

Continuous hydrolysis of aminoalkane-sulphonyl chloride hydrochlorides. Ruhrchemie AG. **784 071**

Manufacture of polymeric quaternary ammonium compounds. Imperial Chemical Industries, Ltd. [Cognate application 37 349.] **784 051**

Modification of the properties of synthetic fibres. Imperial Chemical Industries, Ltd. [Cognate application 37 350.] **784 052**

Nitriding steel. Potts, F. C. (Eidg. Waffenfabrik). **784 062**

Detergents. Marchon Products, Ltd. **783 778**

Pesticidal compositions. Shell Research, Ltd. **783 882**

Cracking heavy hydrocarbon oils. Esso Research & Engineering Co. **784 136**

Sterilisers. Slater & Co. (Engineers), Ltd., J. **783 964**

Water sterilising arrangements. Slater & Co. (Engineers), Ltd., J. **784 137**

Manufacture of cobalt and chromium complexes of monoazo-dyestuffs. Ciba Ltd. [Addition to 741 602.] **784 138**

Manufacture of synthetic resins. Trigge, W. W. **784 141**

Aminoalkyl cyclopolysiloxanes and their preparation. General Electric Co. **783 784**

Preparation of steroid substances. G.N.R.D. Patent Holdings, Ltd. **784 081**

Process for rendering cellulose-containing materials flame-resistant. Ciba Ltd. [Addition to 747 014.] **783 886**

Chlorofluoroacrylic. Fairweather, H. G. C. (General Aniline & Film Corp.). **783 888**

Production of radioactive isotopes. United Kingdom Atomic Energy Authority. **784 125**

Preparation of supplements for animal feeding stuffs. Vitamins, Ltd. **784 145**

Production of aluminium nitride. United Kingdom Atomic Energy Authority. **784 126**

Sonic gas analysers. Parsons & Co., Ltd., Sir H. G. [Cognate application 3 891.] **784 146**

Methods of manufacturing liming type masses or like gas purifying materials and limed sawdust or limed turf utilised as intermediaries in these methods. Fassina, L., and Fassina, Z. **783 975**

Organopoly-siloxanes. General Electric Co. **784 085**

Copolymers of ethylene and articles produced therefrom. British Cellophane, Ltd. **783 790**

Apparatus in which gases are contacted with liquids. Wilisch, J. **783 978**

N:N'-Diarylnaphthoquinone-imines. Sandoz, Ltd. **784 156**

Ducting for conveying air or other gases. Mining Engineering Co., Ltd. **784 158**

Ester amides. Badische Anilin- & Soda-Fabrik AG. **784 058**

Making water-soluble film-forming synthetic polymers. Minnesota Mining & Manufacturing Co. **783 905**

Barium titanate high dielectric constant ceramic material and process of making same. Compagnie Generale De Telegraphie Sans Fil. **783 996**

Low dielectric loss materials with substantially reduced magnesium compounds and higher clay content. Bloch, W. E. H. **783 997**

Heterocyclic compounds. Merck & Co., Inc. **783 908**

Apparatus for the analysis of mixtures of gases by means of gas absorption percolation. Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij. **784 169**

Manufacture of aromatic esters. Imperial Chemical Industries, Ltd. **783 917**

Highly polymeric polymethylene terephthalates. Imperial Chemical Industries, Ltd. **783 814**

Apparatus for the production of gases consisting mainly of hydrogen and acetylene. Lonza Electric & Chemical Works, Ltd. **783 819**

Process for purification of hydroformylation reaction products. Gulf Research & Development Co. **784 016**

Closure device for containers of liquids. General Electric Co. **784 017**

Heterocyclic quinone derivatives. Farbenfabriken Bayer AG. **784 181**

Copolymers of chlorotrifluoroethylene and vinylidene fluoride. Allied Chemical & Dye Corporation. **783 933**

Organopoly-siloxane elastomers. Midland Silicones, Ltd. **783 868**

Process of preparing hydrophobic organo-silicon powders. Midland Silicones, Ltd. **783 868**

Polymerisation of unsaturated aldehydes. Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij. **783 936**

Steroids. Upjohn Co. **784 187**

Attrition resistant alumina. Esso Research & Engineering Co. **784 188**

High-viscosity sulphonation products having viscosity stability. Dow Chemical Co. **784 028**

Halogenated alkanamides and their preparation. Sterling Drug, Inc. **783 828**

Pretreatment of petroleum coke for carbon disulphide manufacture. Esso Research & Engineering Co. **783 942**

Production of artificial leather of deer-skin-like character. Deutsche Gold-Und Silber-Scheideanstalt Vorm. Roessler. **784 190**

Dyeing of mixed textile materials. Soc. Rhodiaceta. **784 191**

Organic sulphur compounds and compositions containing same. Monsanto Chemical Co. **783 944**

Local anaesthetic of the dialkylamino-acetoanilides series. Farbenfabriken Bayer AG. **784 194**

Preparing alkali-metal catalysed polymers. Esso Research & Engineering Co. [Addition to 766 225.] **783 832**

Piperidine derivatives and a process for the manufacture thereof. Hoffman-La Roche & Co. AG., F. **784 198**

Stable solutions of relatively pure glycosides having an action on the heart. Sandoz, Ltd. **784 201**

Binary copolymers of vinyl chloride and dialkyl esters of maleic acid. United States Rubber Co. **783 837**

Dyeing peroxide-bleached wool. Food Machinery & Chemical Corp. **784 205**

Dehydrochlorination process. Ethyl Corp. **783 841**

Agitating apparatus for liquids in bulk. Vereinigte Aluminium-Werke AG. **783 947**

Pharmaceutical composition and preparation thereof. Pfizer & Co., Inc., C. **783 845**

Aqueous micro-crystalline insecticidal dispersions. Imperial Chemical Industries of Australia & New Zealand, Ltd. **783 848**

Polyester amides. Badische Anilin- & Soda-Fabrik AG. [Divided out of 784 058.] **784 059**

Continuous hydrolysis of chloroalkylamine hydrochlorides. Ruhrchemie AG. [Divided out of 784 071.] **784 072**

Open to public inspection on 9 October

Organopolysiloxane pastes. Wacker-Chemie Ges. **784 501**

Catalyst decomposition in carbonylation of olefins. Esso Research & Engineering Co. **784 317**

Process for producing shaped bodies. Farbenfabriken Bayer AG. **784 502**

Process for producing an article or surface with a protective covering of thermoplastic material. British Celanese, Ltd. **784 503**

Machining of metals using liquid carbon dioxide or like medium as a coolant. National Research Development Corp. **784 504**

Oximes of cycloaliphatic ketones. Farbwerke Hoechst AG. **784 608**

Reducing acidity of nitric acid solutions containing metal salts. United Kingdom Atomic Energy Authority. **784 609**

Formulations for use in radiography. Ortho Pharmaceutical Corp. **784 215**

Manufacture of anthraquinone dyestuffs. Ciba Ltd. **784 396**

Composition for eliminating minor element deficiencies in plant growing media. Dow Chemical Co. **784 508**

Polyisocyanate alkyd resin compositions. Lockheed Aircraft Corp. **784 398**

Production of pigmented rolled masses for use in lacquers. Deutsche Gold-Und Silber-Scheideanstalt Vorm. Roessler. **784 512**

Ceramic Materials. United Kingdom Atomic Energy Authority. **784 321**

Solvent extraction processes. Union Francaise Commerciale et Industrielle. [Cognate application 9 052.] **784 514**

Means for supplying sterilised gas under pressure. Power Jets (Research & Development), Ltd. **784 220**

Preparing β-ketoacetals. Eastman Kodak Co. **784 610**

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on
THURSDAY, 3rd OCTOBER, 1957

OFFICIAL APPOINTMENTS

SENIOR SCIENTIFIC OFFICERS: SCIENTIFIC OFFICERS. The Civil Service Commissioners invite applications for pensionable appointments covering a wide range of scientific research and development in most of the major fields of fundamental and applied science. In Biological subjects the number of vacancies is small: individual vacancies exist in the Natural History Museum for candidates who have special knowledge of, or who are interested in, crystallography, taxonomic entomology, palaeobotany, malacology, acarology.

Scientific Officers are urgently required for the Forensic Science Laboratories; for scientific examination of document and hand-writing cases at Cardiff: for Chemists at Preston, Harrogate and in London. There is also a vacancy for a Senior Scientific Officer (Biologist) at Harrogate.

The Royal Naval Scientific Service require a Scientific Officer (male) for the National Institute of Oceanography to work on oceanic Cephalopoda.

Candidates must have obtained a university degree with first- or second-class honours in an appropriate scientific subject (including engineering) or in Mathematics, or an equivalent qualification, or be otherwise qualified by high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience.

Age Limits: Senior Scientific Officers, between 26 and 31, but specially suitable candidates under 26 may be admitted; for Scientific Officers between 21 and 28 during 1957 (up to 31 for permanent members of the Experimental Officer class). Salary (London) Senior Scientific Officers: Minimum £1,190 (women £1,098). Men's scale maximum £1,410. Scientific Officers: Minimum £635. Men's scale maximum £1,110. Women's pay above £635 slightly lower but being raised to reach equality with men's in 1961. Somewhat lower rates in the provinces. 5-day week, generally.

Further particulars, from Civil Service Commission, Scientific Branch, 30 Old Burlington Street, London, W.1, quoting No. S.53/57 for Senior Scientific Officers and S.52/57 for Scientific Officers.

Interview Boards will sit at intervals, as required. Early application is advised.

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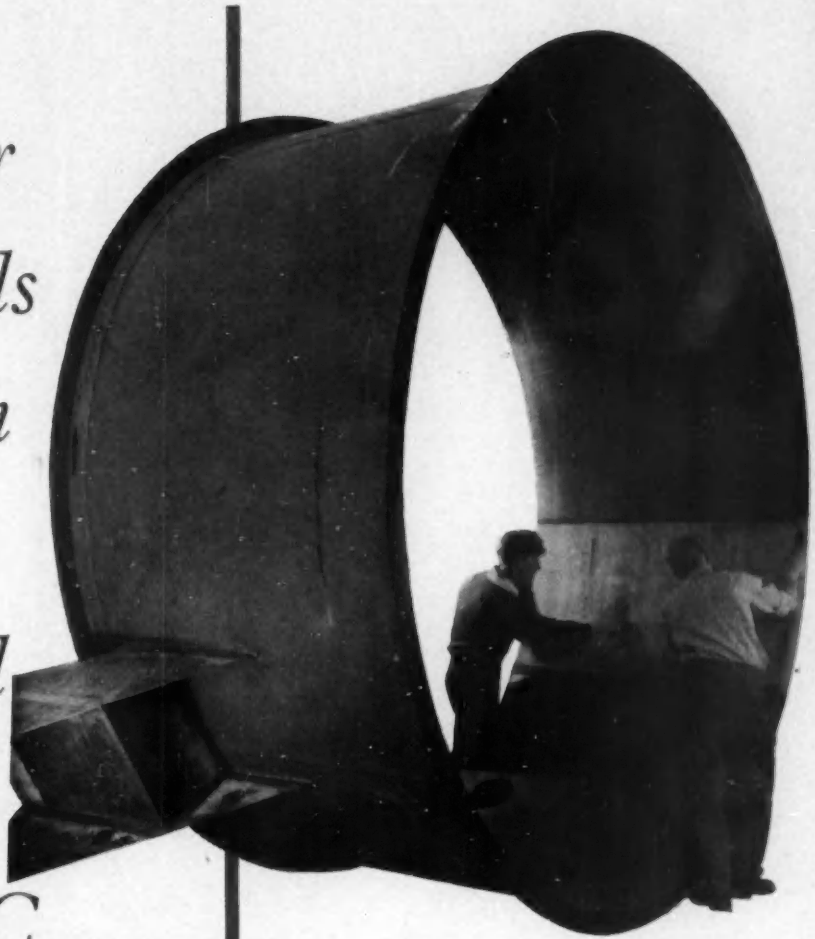

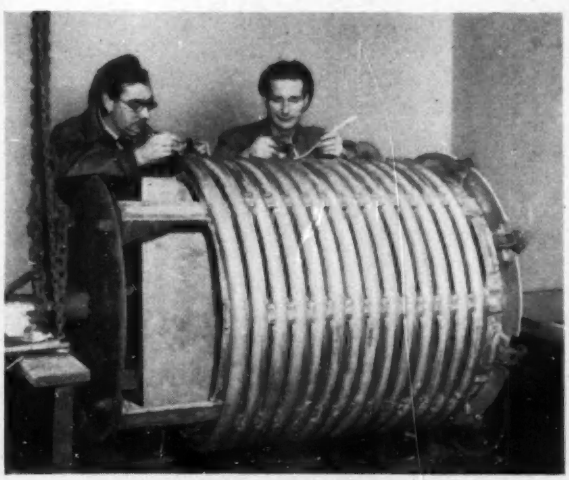

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